

10/01/87
Rev B

PRELIMINARY

CAMBEX CERTAINTY SERIES 80820-10
Streaming Tape System
Manual

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1.0 General Description

The 80820-10 Streamer Tape Subsystem provides up to 260 Megabytes of tape storage on two 1/4 inch tape cartridges for the IBM Series/1 Computer System. The Streaming Tape Subsystem consists of an Attachment Card and a 1/4 wide enclosure which contains the Drive Formatter and two Tape Drives (see Figure 1.0 Streamer Tape Subsystem). The two Tape Drives (Drive 1 and Drive 2) may be operated either as a dual Tape Drive system or as a single Tape Drive system in which the operator selects the Tape Drive being used. As a standard feature, the interconnect cable between the Attachment Card and the 1/4 wide enclosure is a "quick disconnect" cable. The 1/4 inch tape cartridge is industry standard DC600A or DC600XTD and utilizes 15 recording tracks.

A new feature of the 80820-10 Streamer subsystem is the high speed search (under six minutes) for blank tape when under operator control. However, the conventional sequential track search is required to prevent duplicate "Save Names" when under software control.

Downward compatibility with the 80810-10 Streamer Tape Subsystem is provided in that the 80820-10 Streamer Tape Subsystem will read 60 MB cartridges "Saved" by the 80810-10 Streamer Tape System. However the 80810-10 Streamer Tape Subsystem will not read cartridges "Saved" by the 80820-10 Streamer Tape Subsystem. As well, the 80820-10 Streamer Tape Subsystem cannot use the DC300 cartridges because of low coercivity media.

1.3 Architecture

The Attachment Card provides the basic command recognition, interpretation, and response to the Series/1 I/O channel (see Figure 1.31 80820-10 Block Diagram). As required, the Attachment Card generates basic commands to control the Drive Formatter (Rewind, Read, Write, etc). For data integrity, a hardware checksum (32 bit CRC) is generated on the Attachment Card and appended to the data as the last block before the file mark.

The Drive Formatter receives commands from the Attachment Card and provides data buffering, data formatting (QIC 120), CRC checking (16 Bit) on each 512 Kbyte block, and Phase Locked Loop data recovery. The Drive Formatter controls the Tape Drive by providing drive selection, track selection, and motor control. The Drive Formatter is configured to support two 130 MB Tape Drives.

The Tape Drive is controlled by the Drive Formatter and records data on cartridges which conform to ANSI Standard 1/4 inch tape cartridges. The primary elements of the drive are the magnetic read/write/erase head, the head carriage and stepper motor assembly, the drive control board, and the basic mechanical assembly to which all of the above are mounted.

Mechanically, two half height 130 MB Tape Drives along with a common Drive Formatter are mounted in a 1/4 wide enclosure. The AC power entry and DC power supply for the electronics are also contained in the same enclosure. A quick disconnect cable is standard to provide ease of serviceability.

Software support of the 80820-10 is provided for either RPS or EDX operating systems. Due to technology differences, the 80820-10 instruction set is not compatible with the instruction sets of the IBM 4968 Streaming Tape unit or the IBM 4969 Tape Unit. The 80820-10 is supported as an EXIO device for EDX. For RPS, the 80820-10 is supported by xxxxxx.

A Stand-alone Utility that does not require an operating system, is also provided that transfers data on operator specified boundaries rather than volumes or data sets. It also provides the capability to IPL the operating system to the disk on the system.

The use of the two drives simultaneously or in a dynamic alternating pattern is prohibited by the hardware. Both drives must be at the beginning of the tape for the Drive Formatter to select a new drive. This is a necessity since there is no position information available over the interface from the Tape Drive.

2.0 OPERATION

2.1 Attachment Card I/O Operations

The Attachment Card is a circuit card assembly that incorporates LSI channel logic, LSI hardware checksum (32 bit), and a Z80 microprocessor (see figure 2.10 Attachment Card Block Diagram). The Attachment Card also provides the interface to the Drive Formatter.

The Attachment Card responds to Processor issued Direct Program Control (DPC) and Cycle Steal (CS) commands (see Table 2.11 DPC and CS Commands). The DPC commands are commands under Processor Control for basic set up of the Attachment Card. The Cycle Steal commands are under device control and provide for data I/O transfers in cycle steal mode with an interrupt posting completion of the command.

All commands begin with a two word Immediate Device Control Block (IDCB). See Figure 2.11 Immediate Device Control Block Format. The first word contains command and device address information. If a DPC command, the second word contains immediate data or is zero filled if none is required. If a CS command, the second word contains the address of an eight word Device Control Block (DCB).

For both DPC and CS commands, the Attachment Card receives the IDCB containing the command, checks the IDCB for errors and validity, and responds with appropriate condition code. For commands under DPC, the Attachment Card also performs the function requested.

For DPC commands, the condition code provides current device status information. For CS commands, the first condition code provides information concerning acceptance of the command by the Attachment Card. Upon interrupt servicing by the processor, the Attachment Card provides a second condition code and an interrupt word. The second condition code contains status information regarding the end-of-command execution. The interrupt word (see figure 2.12 Interrupt IIB or ISB) provides the address of the device requesting the interrupt and a zero-filled interrupt information byte (IIB). If the condition code indicates an improper ending of the command execution, the IIB bits have a special meaning, and the byte is referred to an interrupt status byte (ISB).

5 The Attachment Card provides up to 10 bytes of status information for error recovery. The Attachment Card transfers these bytes to the Series/1 processor via the Start Cycle Steal Status command.

The DPC commands are Prepare, Device Reset, and Read Device ID. The Prepare command sets up the Attachment Card so that it may respond properly with an interrupt to a CS command. The Device Reset terminates the current operation resets pending interrupts and clears previously established controls and status. The Read Device ID commands the Attachment Card to return its ID and is used to verify the proper devices are at the correct addresses.

If the command is a CS command, the second word of the IDCB contains the address of an eight word data block that provides all the parameters that the Attachment Card requires to execute the command (see Figure 2.13 Device Control Block).

The CS command Start is used by the system software to transfer data. The CS command Cycle Steal Status along with Start Diagnostic 3 is used by the system software to transfer status. In general, the three Diagnostic commands (Start Diagnostic 1-2-3) are used primarily by the Diagnostics.

The primary command used is the Start command which transfers data. The DCB Word 0 for the Start command provides parameters for the cycle stealing operation (Bits 0-7) and binary I/O codes for commands (Bits 8-15) to the Drive Formatter (see Figure 2.14 DCB Word 0).

2.2 Drive Formatter Operation

The Drive Formatter is a circuit assembly that has a 8085 microprocessor and LSI for data circuitry (see Figure 2.20 Drive Formatter Block Diagram). Most of its operating characteristics are under firmware control.

The Drive Formatter receives its commands from the Attachment Card over a QIC 02 interface (see Figure 2.21 QIC 02 Interface). All the commands are single bytes received from the Attachment Card (Table 2.21 Drive Formatter Commands). If an undefined command code is received, the Drive Formatter returns an illegal command status to the Attachment Card.

Select Drive 1

The Select Drive 1 Command selects drive 1. Drive 2 must be at BOT before issuing the Select Drive 1 Command. Note also, a Reset Command to the Attachment Card automatically selects Drive 1.

Select Drive 2

The Select Drive 2 Command selects drive 2. Drive 1 must be at BOT before issuing the Select Drive 2 Command. Note also, a Reset Command to the Attachment Card automatically selects Drive 1.

Rewind

The Rewind Command positions the tape to the BOT position.

Re-Tension

To alleviate potential tape tension problems, the Re-tension Command causes tape movement to the beginning of tape (BOT), then to the end-of-tape (EOT), and finally back to the BOT position.

Erase Command

To completely erase a tape, the Erase Command moves the tape to BOT, activates the erase head, moves the tape to EOT, deactivates the erase head, and repositions the tape to the BOT.

Write Command

A Write Command following cartridge insertion or the issuance of a device reset cause recording to begin at the BOT position. At all other times, recording begins at the current tape position. Note also, any recording on track 0 activates the erase head erasing all tracks at the same time it records track 0.

Write File Mark Command

The Write File Mark Command causes the Tape Drive to write a file mark on the tape.

Read Command

A Read Command following cartridge insertion or the issuance of a device reset causes the read operation to begin at beginning of tape (BOT). At all other times, the read operation begins at the current tape position.

Read File Mark

The Read File Mark Command causes the Tape Drive to advance tape to the next file mark.

Read Status

When the Read Status Command is received, the Drive Formatter transfers 6 Status Bytes to the Attachment Card (see Table 2.22 Drive Formatter Status).

Search For Unrecorded Data

The Search For Unrecorded Data provides for a high speed search for blank tape that completes in less than six minutes. The completion will be indicated by a 02 Condition Code from the Attachment Card with Cycle Steal Status word 2 equal to Hex 82.

Read Formatter ID

The Read Formatter ID is used to determine whether a 60MB or 130MB drive is attached. The 60MB drive will return an 02 condition code from the Attachment Card and the Cycle Steal Status will indicate an Illegal Command. The 130MB drive will return an 03 condition code from the Attachment Card.

2.3 Tape Drive Operation

The Tape Drive consists of an aluminum casting which is the primary support for the internal elements of the drive and also provides mechanical support for mounting of the drive. The primary elements of the Tape Drive are the magnetic read/write/erase head, the head carriage and stepper motor assembly, the drive control board, and the basic assembly to which all of the above are mounted (see Figure 2.30 Tape Drive Block Diagram).

The Tape Drive receives its commands over a QIC 36 interface (see Figure 2.31 QIC 36 Interface). Because the QIC 36 I/O cable is very short, a double termination is permitted allowing both of the daisy chained Tape Drives to have a terminator. As well, the QIC 36 I/O cable has a twist in the select lines between the Tape Drives allowing both units (logical Drive 1 and Logical Drive 2) to be selected as physical drive 0.

The following are all signals received by the Tape Drive.

GO

A low level signal at the GO line will initiate tape motion. A high level signal will terminate tape motion.

REV

A low level signal at the REV line will cause tape motion in the reverse (EOT to BOT) direction. A high level signal will cause the tape motion in the forward (BOT to EOT) direction.

TRO-TR4

These lines are used to determine head positioning with respect to track location. TR4 is the most significant bit while TRO is the least significant (all signals high is track 0).

RST

A low level signal at the RST line initiates a Reset pulse to the Tape Drive microprocessor which positions the head to recalibration position and terminates any operation being performed.

DS1

A low level signal at the DS1 line is used to select drive #1. Not used on the 80820-10 Streamer Tape Subsystem. Note: the I/O cable between Tape Drive 0 and Tape Drive 1 has a twist in it so that both Tape Drives can be jumpered for drive 0 operation.

DS0

A low level signal at the DS0 line is used to select drive #0 for operation. This is the standard select configuration for the drive.

HC

A low level signal at the HC line is used to select high write current to the write amplifier. This function is normally performed with the Tape Drive microprocessor and therefore is not normally used.

WDA-/WDA+

A differential pair of lines used to supply digital write information to the write amplifier circuitry.

THD

A low level signal at the THD line will select the write threshold level. A high signal will select the read threshold level. This function is normally performed with the Tape Drive microprocessor and therefore is not normally used.

HSD

A low level at the HSD line is used to select the high speed (90 IPS) rewind and fast forward operations. This function is normally carried out in the Tape Drive microprocessor. WEN

WEN

A low level signal at the WEN line enables the Tape Drive to write data to the tape.

EEN

A low level signal at the EEN line enables the Tape Drive to erase the tape cartridge if it is on track 0 and is moving forward from BOT.

The following are all signals sent by the Tape Drive.

RDP

A low level signal at the RDP line indicates a data pulse transition is detected.

UTH

A low level signal at the UTH line indicates the the upper tape hole has been detected.

LTH

A low level signal at the LTH line indicates the lower tape hole has been detected.

SLD

A low level signal at the SLD line indicates the Tape Drive is selected.

CIN

A low level signal at the CIN line indicates that a cartridge is inserted in the Tape Drive.

USF

A low level signal at the USF line indicates that it is safe to write data to the cartridge.

TCH

A low level at the TCH line indicates that a tachometer pulse has been detected.

2.4 1/4 inch Tape Cartridge Operation

The 1/4 inch tape cartridges designed for use in the 80820-10 product are the DC600A or DC600 XTD manufactured by 3M or the DEI Series II High Coercivity tape cartridges. High coercivity (550 Oersted) cartridges must be used for proper operation to generate the QIC 120 data format. The low coercivity (310 Oersted) cartridges can only be used for reading cartridges that were generated with a QIC 24 data format. The QIC 120 data format provides for recording on 15 tracks a minimum of 125 MB using 512 byte blocks (see Figure 2.40 Data Block Format). Note: The QIC 24 data format uses the same data block format but at a lower track density (9) and lower bit density.

From a data perspective, two 256 byte sectors from a disk are blocked into 512 byte blocks on tape (see figure 2.41 80820-10 Tape Format). Note: the 80810-10 Streamer Tape Subsystem uses the same format. From a file checksum generated on the Attachment Card, a hardware checksum block is appended to the data in an extra block before the file mark block. Thus for maximum data integrity, there is a CRC check both at the individual data block level and at the file level.

The cartridge is loaded into the Tape Drive by placing the cartridge into the front loading slot. Insert the cartridge door end first with the door at the bottom (see Figure 2.42 Cartridge Loading). The tape is then loaded by pushing the cartridge into the drive until resistance is felt and the cartridge will slide in no further. At this point, release the cartridge and it will eject slightly outside the confines of the front bezel and will be retained by a latch that swings out. At this time, the cartridge is properly loaded into the drive.

The cartridge is unloaded from the Tape Drive in the same manner. To release the cartridge, push the cartridge into the tape drive until resistance is felt and the latch releases. This is signified by an audible "click". At this time release the cartridge and it will be ejected partially out of the drive assembly. The cartridge can be removed at this time.

Note: The data on the cartridge may be protected from erasure by turning the write protect indicator to the safe position (see Figure 2.43 Write Protect Feature). This prevents the cartridge from being erased or from appending files.

3.0 Installation

Install the Streaming Tape Attachment Card in the Series/1 processor as follows:

3.3.1 Determine from the customer the required location of the Attachment card, the location of the Streaming Tape Drive enclosure, and the required device address. (see Figure 3.3.1 Streaming Tape Attachment Card). Priority is established in the order of placement from right to left within the Series/1 mainframe card chassis. The processor unit has a higher priority than the I/O expansion unit.

Note: Insure that the operating system has had the Streaming Tape Software included in its "System Generation" before attempts are made to operate other than with diagnostics or Standalone Utilities.

3.3.2 Check with the customer before turning power off. Then power down the processor unit or expansion unit, as applicable, by pressing the associated power on/off switch.

Caution: Ensure the Muffin fans for the Series/1 Processor, if so equipped, are clean and unobstructed so as to provide adequate air flow.

3.3.3 Remove the snap-on cover from the front of the processor or expansion unit as applicable and open the rear access door of the Series/1 cabinet.

3.3.4 Connect the I/O Cable to the enclosure for the Streaming Tape.

3.3.5 Route the I/O cable to the Attachment Card location. Clamp the pigtail ground of the attachment card end of the cable to the horizontal ground strip located at the top front of the processor unit or expansion unit as applicable (See Figure 3.3.5 Cable Locations and Series/1 Power Adjustments).

3.3.6 Verify that the microprocessor clock jumper and firmware are installed (see Figure 3.3.1 Streaming Tape Attachment Card) and no more than one open card location is to the right of the Attachment Card.

Note: If the Attachment Card is to be installed more than one open card location away from existing cards, add a poll propagate jumper between M11 and M12 of each open card slot (see Figure 3.3.6 Series/1 Backpanel Pin Configuration).

3.3.7 Set the Attachment Card address to the configuration required by the customer (See Figure 3.3.7 Streaming Tape Attachment Card Switch Settings).

Caution: Do not use a lead pencil to set switches. Graphite dust from the pencil can cause an equipment malfunction.

3.3.8 Install the Attachment Card in the Series/1 location required by the customer. Proper technique is required for insertion of attachment cards to avoid possible damage to backpanel pins and/or frustration in unsuccessful attempts to seat the card. A recommended technique is described in the following caution note.

CAUTION

The most critical aspect of installing the Attachment Card is ensuring that the Attachment Card connectors have properly engaged the short metal guides and sockets at the back of the card chassis (see Figure 3.3.8 Backpanel Guides and Sockets). With the component side of the card on the right, began the insertion process by locating the Attachment Card plastic card guide directly over the line printed on the chassis for the card slot. Next insert the Attachment Card into the plastic card guides which engage the top and lower edge of the plastic card guide on the Attachment Card. Then continue to insert the Attachment Card until it engages the short metal guides. By providing a slight rocking action, the Attachment Card will engage properly into the metal guides. Continue the slight rocking action and gently engage the sockets until a firm stop is felt. Then place the palm of the hand on the card guide handle and perform the final seating action quickly and firmly. A definite snap action should be felt accompanied by a "thud" sound as the card is seated. An excessive force (more than 50 pounds) indicates that the Attachment Card was not properly aligned or was catching on an adjacent card. If the seating action was unsuccessful, withdraw the Attachment Card and verify that there are no bent pins in the backpanel or no adjacent card restricting seating. Then reattempt the insertion of the Attachment Card. In some cases, particularly with old backpanels, it may be desirable to select another location if the seating action was unsatisfactory.

3.3.9 Plug the connector of the I/O Cable into the connector on the Attachment Card (see Figure 3.3.1 RTA Attachment Card).

3.3.10 If you are installing the Attachment Card in a Series/1 4952-A, go to step 3.3.12. For other models, adjust the overcurrent potentiometer as follows:

- a. Apply power to the Series/1 processor unit (or expansion unit) in which the attachment card is installed. If the chassis power does not come up, turn the overcurrent potentiometer (refer to figure 3.3.5 Cable Locations and Series/1 Power Adjustments) clockwise one full turn; then press the unit power on/off switch to off, then to on. Keep repeating this clockwise adjustment and power sequencing until power comes up. When power is up, go to step b.

b. Turn the overcurrent potentiometer slowly counter-clockwise until power goes off. After removing power, adjust the potentiometer as follows:

- For the 125 Watt supply on Series/1 Models 4953-A/C: eight full turns clockwise.
- For the 300 Watt supply on Series/1 Models 4953-B/C and 4955-A/B/C/D: four full turns clockwise.
- For the 400 Watt supply on Series/1 Models 4952-B and 4955-E: seven full turns clockwise.

c. Press the power on/off switch on the Series/1 processor to off, then to on. If the Check indicator on the Series/1 operator/programmer panel lights following power application, an electrical malfunction exists on the attachment card or a problem has developed in the Series/1. If the Check indicator lights, replace the attachment card and retry the sequence. If the error condition persists, remove the attachment card and retry the sequence to determine if the problem is in the Series/1.

3.3.11 Check and adjust the +5V potentiometer on Series/1 Models 4952, 4953, and 4955, as follows (no adjustment is required on Model 4952-A/C and all models of 4954 and 4956):

CAUTION

If a probe tip touches a signal and voltage pin at the same time with power applied, the attachment card can be damaged.

- a. Turn Series/1 power off.
- b. Remove the Series/1 backpanel cover.
- c. Connect a voltmeter to backpanel pins (see figure 3.3.6 Series/1 Backpanel Pin Configuration)and measure +5Vdc at A2D03 and Ground at A2D08.
- d. Apply power to the Series/1 and adjust the +5V potentiometer (refer to figure 3.3.5 Cable Locations and Series/1 Power Adjustments) for +5V +/- 0.5V. Adjust as close to nominal as possible.
- e. Turn Series/1 power off, disconnect the voltmeter, and replace the backpanel cover.
- f. Reapply power to the Series/1.
- g. Go to step 3.3.13.

NOTE

The following step applies only to the Series/1 Model 4952-A.

3.3.12 Set the minimum load switch on the Series/1 Model 4952-A as follows:

- a. Verify that the Series/1 power On/Off switch is in the Off position.
- b. Remove the rear cover of the Series/1 power supply and lower the hinged transformer box to view the minimum load switch (see figure 3.3.12 Model 4952A Power Supply).
- c. If four or fewer cards are installed in the logic chassis, set the minimum load switch to the On (up) position. If five or more cards are installed, set the switch to the Off (down) position.
- d. Return the transformer box to its upright position and replace the cover.
- e. Place the Series/1 power On/Off switch to the On position. If the check indicator on the Series/1 operator/programmer panel lights following power application, an electrical malfunction exists on the attachment card or a problem has developed in the Series/1. If the Check indicator lights, replace the attachment card and then retry the power-up sequence. If the error persists, remove the attachment card and retry the power-up sequence to determine if the problem is in the Series/1.

3.3.13 When no Check condition exists in the Series/1, then verify that the self-test red LED (LED #1) on the attachment card is off. If the self-test LED lights, replace the attachment card.

3.3.14 Attach the equipment identification plate and FCO log for the disk subsystem to the attachment card plastic card guide (see figure 3.3.14 Attachment Card FCO Log/ID Plate).

3.3.15 Replace the front snap-on panel and close the rear door of the Series/1 cabinet.

Maintenance : head cleaning, cartridge service life, environmental, retention.

5.0 Checkout/Maintenance

The Diagnostics give the user the option of testing either a 80810-10 (60MB) or 80820-10 (260MB) Tape Subsystem. The Diagnostics are organized as a group of linked tests (5900-5903 and 5913) for routine checkout. For diagnosis of marginal data operation or mechanical problems (EOT, head stepping), run test 5904. Because of the extensive testing in test 5904, a 150 foot tape is recommended to reduce the test time. Also a utility (5910) is provided for basic tape operations such as retention, Read File Mark, etc.

Because of the dual drive configuration, the 80820-10 test options include: test drive 1 only, test drive 2 only, and test both drives.

The following is a brief description of the tests.

Note: The diagnostics will run thru test 5902 without the I/O cable on the Attachment card or the power off on the tape drive. The first failure without the tape drive available will be at test 5903 step 07.

5900 Channel Interface Tests

5901 DCB and internal Attachment Card Tests.

5902 Read/Write Attachment Card Ram Tests.

5903 Read/Write/Compare Drive Data Tests (Drive 1 only).

5913 Read/Write/Compare Drive Data Tests (Drive 2 only).

5904 Data Reliability/Head Step/EOT Tests (manual test).

5910 Drive Utilities (manual tests).

The Drive utility options include: Read Cycle Steal Status, Rewind, Retention, Read File Mark, and Erase.

CHECKOUT

Checkout of the 80820-10 Streaming Tape involves:

- o Updating the Cambex Diagnostic Diskette Configurator Table.
- o 80820-10 Streaming Tape Operational Checkout.

UPDATING THE CAMBEX DIAGNOSTIC DISKETTE CONFIGURATOR TABLE

Before you can load and execute the diagnostics for checkout, the 80820-10 Streaming Tape must be a device on the system configurator table of the Cambex diagnostic diskette.

This subsection provides information necessary to add the Streaming Tape to the existing system configurator table of the Cambex diagnostic diskette or to generate a system configurator table.

The configurator table on each diskette must, at a minimum, contain the configuration information for all devices to be tested by that diskette. The following procedure allows you to update the configurator table by adding the devices individually or by performing the configure system option (OC).

Note: The configurators on IBM diskettes do not recognize Cambex devices; therefore, do not attempt to use an IBM configurator to construct the configurator table on a Cambex Diagnostic diskette. All Cambex devices will be configured incorrectly in the table.

1. Apply power to the Series/1 flexible disk drive (FDD) unit and install the Cambex diagnostic diskette.

Note: The Cambex diagnostics diskette has a preassigned alternate console selected for either a Cambex 80610-XX Display or an IBM 4979 Display (AATT = 0442).

2. Place the IPL Source switch on the Series/1 operator/programmer panel to the Alternate or the Primary position, as applicable, to enable loading from the diskette.
3. Place the Mode switch on the Series/1 operator/programmer panel to the Diagnostic position.

4. Press the Load switch on the Series/1 operator/programmer panel, to load the IPL diagnostic that resides on the diagnostics diskette (IPL time is approximately 10 seconds). Go to step 4a, 4b, 4c, or 4d, as applicable.

- a. If an alternate console is assigned per the preconfigured diskette (see note following step 1), all messages appear on the assigned alternate console and on the operator/programmer panel, if present.
 - o If a configurator error message appears on the CRT screen (3822 on the operator/programmer panel), the configurator table does not match the system configuration. Ignore this error and go to step 6 to update the table.
 - o If a disconnect customer interface message appears on the CRT screen (382A on the operator/programmer panel), go to step 12.
 - o If any other message appears on the CRT screen (38XX on the operator/programmer panel), this error must be corrected before continuing. Refer to the Common Halt List in section 5, Maintenance, for error halt code descriptions.
- b. If an 80610, 4978, 4979, or TTY display device is present but no message appears on the CRT screen and an operator/programmer panel is not available, perform the following steps to assign an alternate console:
 - 1) Install an existing diskette (IBM or Cambex) that has an alternate console assigned correctly.
 - 2) Press the Load switch to IPL the diskette.
 - 3) When the IPL completes, a message appears on the CRT screen. Remove the diskette and install the new diskette that is to be configured.
 - 4) Enter B38F9 (menu appears on the screen).
 - 5) Enter F02 to select the patch program option.
 - 6) Enter F38F1 (data set name).
 - 7) Enter F3008 (start address).
 - 8) Enter F0001 (word count).

- 9) Enter the device address and the device type of the desired alternate console in format FAATT where:

AA = device address

TT = device type of alternate console as follows:

40 for a TTY device

42 for either a Cambex 80610 or an IBM 4979 display

45 for an IBM 4978 display

81 for FPMLC with RPQ 2350

E6 for Multifunction

E8 for ACCA single line

E9 for ACCA multi-line

EA for FPMLC

If you are using a 3101 or 5251 display, use the device address/device type and the switch settings for an alternate console as shown in the following chart:

3101 and 5251 Device Address Device Type and Switch Settings

AATT where: AA = console device address

TT = console device type

1310 Multifunction	AAE6	-- see (a) switch settings
3101 Display	AA81	-- see (a) switch settings
3101 Display ACCA SL	AAE8	-- see (e) switch settings
3101 Display ACCA ML	AAE9	-- see (e) switch settings
3101 Display FPMLC	AAEA	-- see (a) and (b) switch settings
TTY Attachment	AA40	-- see (c) and (d) switch settings

5251 Display E400 E400 AAE4

00XY where: X = cable address (0-3)
in register 1

Y = station address (0-6)
in register 1

NOTE X = switch position. Do not change the positions that are blank. Leave them in the position found. When done, return moved switches to original position.

- (a) 3101 switch setting checklist when supported by FPMLC current interface, RPQ DQ2350 and 1310 Multifunction:

<u>12345678</u>	<u>12345678</u>	<u>12345678</u>	<u>12345678</u>
X	X	X X	X X
X X	X		XX

- (b) 3101 switch setting checklist when supported by FPMLC with RS232C:

<u>12345678</u>	<u>12345678</u>	<u>12345678</u>	<u>12345678</u>
XXX	X	X X	X X
X	X		XX

- (c) 3101 switch setting checklist when supported by TTY with EIA interface:

12345678	12345678	12345678	12345678
X		XX	X X
XX	X X	X	XX

- (d) 3101 switch setting checklist when supported by TTY current interface:

12345678	12345678	12345678	12345678
X		XX	X X
XXX	X X	X	XX

- (e) 3101 switch setting checklist when supported by ACCA SL - ML EIA RS232C:

12345678	12345678	12345678	12345678
XXXX		X X	XXX
X	X XX		X

- 10) A patch complete message indicates that the new alternate console assignment has been written on diskette.
 - 11) Press the Load switch. After completing the IPL, all messages should now appear on the assigned alternate console. Go to step 6 to update the configurator table.
- c. If a display or TTY is present and a 3801 halt code appears in the register indicators of the operator/programmer panel, but no message appears on the CRT screen, perform the following steps to assign an alternate console other than the programmer panel:

- 1) To continue, enter:

(B),6,(I),(I)

- 2) The next halt code is 382A (secure customer interface), 3822 (configuration errors on system), or 382E (option table available for entry).

- For a 382A halt code, enter the following sequence to advance to 3822 or 382E:

(B),6,(I),(I)

- For a 3822 halt code, enter the following sequence to advance to 382E:

(B),1F,(I),(B),0300,(I),(I)

- For a 382E halt code, enter the following sequence to select alternate console option:

(B),1F,(I),(B),0400,(I),(I)

- 3) The next halt code is 3821 (enter alternate console device address and device type). Enter the following sequence:

(B),1F,(I),(B),AATT,(I),(I)

Where: AA = device address
TT = device type

If a 3829 (no device) halt occurs, an entry error has been made.

Enter the following sequence to continue and reselect the alternate console option:

(B),6,(I),(I)

- 4) The next halt code is 382E (the option table is available for entry). Enter the following sequence to write the new alternate console assignment on the diskette:

(B),1F,(I),(B),0D00,(I),(I)

- 5) The next halt code is 382C (copy configurator table to another diskette?). Enter the following sequence to terminate:

(B),1F,(I),(B),0500,(I),(I)

- 6) A 3800 or a 3805 halt code indicates completion of the program terminate function.
- 7) Press the Load switch to re-IPL. All messages will now appear on the CRT screen of the assigned alternate console. Go to step 5 to update the configurator table.

- d. If no alternate display or TTY console is present and a 3801 halt code appears in indicators of operator/programmer panel, perform the following steps to assign the operator/programmer panel as an alternate console:

- 1) To continue, enter:

(B),6,(I),(I)

- 2) The next halt code is 382A (secure customer interface), 3822 (configuration errors on system) or 382E (option table available for entry).

- For a 382A halt code, secure the customer interface and enter the following sequence to advance to 3822 or 382E:

(B),6,(I),(I)

- For a 3822 halt code, enter the following sequence to advance to 382E:

(B),1F,(I),(B),0300,(I),(I)

- For a 382E halt code, enter the following sequence to select the alternate console option:

(B),1F,(I),(B),0400,(I),(I)

- 3) The next halt code is 3821 (enter the alternate console device address and device type). Enter the following sequence to assign the operator/programmer panel as an alternate console:

(B),1F,(I),(B),0000,(I),(I)

- 4) The next halt code is 3832 (operator/programmer panel is the assigned alternate console).

- 5) To continue, enter:

(B),6,(I),(I)

- 6) The next halt code is 382E (option table is available for entry). Enter the following to write the new alternate console assignment on the diskette:

(B),1F,(I),(B),0D00,(I),(I)

- 7) The next halt code is 382C (copy the configurator table to another diskette?). Enter the following sequence to terminate:

(B),1F,(I),(B),0500,(I),(I)

- 8) A 3800 (ready) halt code indicates the system is ready for any valid input.

NOTE

The following steps assume you are using a display with keyboard as the alternate console. If you use the operator/programmer panel as the alternate console, see Configuration Table Information in section 5, Maintenance, for operator/programmer panel entries.

5. If the diskette has no configuration errors, enter B38F0 to display the option table.
6. Enter F03 and press the ENTER key on the keyboard of the assigned alternate console to display the option table.
7. Enter FOB to bypass the entries on the option table display.
8. Skip steps 9 through 16 if you are adding to the existing configurator table, and go directly to step 17.
9. Enter F0C to select the configure system option and follow the series of prompts on the alternate console display. The new configurator table is automatically written onto the diskette.
10. An option to write the configurator table on another diskette or to terminate appears on the CRT screen.

Enter F05 to terminate. PT ENTER displays on the CRT screen.

11. Enter B38F0 to display the option table.
12. Enter FOB to bypass the entries on the option table display.

NOTE

Some Cambex and IBM devices have the same read device ID codes assigned. The configure system option assigns Cambex device types to all IBM devices that have the same read ID code as the Cambex devices. These IBM devices must be manually changed in the configurator table. To determine which device types in the table require changing, enter F09 (Print System Equipment) to display all system devices on the table. Compare this listing with the customer equipment list to determine which device types to change.

13. Enter F01 to display the configurator table.
14. Enter F03 to select the modify option.

15. Enter the correct device type for each table entry to be modified by following the prompts on the alternate console. Refer to table 5.10 for device type assignments.

Table 5.10 IBM/Cambex Device Type Assignments

Read ID Code	IBM Product	Device Type	Cambex Product	Device Type
0406	4979	44	80610	42
0206	4974	64	80420	62
0106	4964	48	80210	46
00AA	4962	78	80230	72
00CA	4962	78	80230	72
0306	4973	68	80450	66
3187	N/A	N/A	80810	59
3X06	4963	7A	80220	74
3X16	4967	7B	80250	75

16. Go to step 20.

17. Enter F01 to display the configurator table.

18. Enter FOA (add option), F02 (delete option), F03 (modify option), or any other desired option from the option table, as applicable, to make changes or additions to the configurator table.

19. Enter the Streaming Tape device parameters per the following format and press the ENTER key.

```

F XX59 0000 0000 0000 0000 0000 0000 3187
  |                                     |
  |                                     | Read ID (always 3187 for 80820-10
  |                                     | Streaming Tape Attachment Card)
  |                                     |
  |__Device Type (59 for 80820-10 Streaming Tape)
  |
  |__Device Address (use the address that was established during
  | attachment feature installation)

```

The response to this input is:

```

FUNCTION
ENTER

```

Enter configuration information for all other Cambex devices in the system at this time. Refer to the applicable site maintenance information manual for individual device entry parameters.

20. Enter F01 and press the ENTER key to display the configurator table. Verify that these parameters were correctly entered.
21. Enter F0D and press the ENTER key to write the new configuration information on the diskette. If additional diskettes are to be written, install the diskette and repeat this step for each diskette.

22. Enter F05 to terminate the program. The PT ENTER message indicates that the terminate function is completed.

STREAMING TAPE OPERATIONAL CHECKOUT

Post-installation checkout consists of loading and executing the Streaming Tape storage subsystem diagnostics. Load and execute the diagnostics as follows:

1. Insert the diagnostics diskette supplied as part of the installation kit into the Series/1 flexible disk drive (FDD).
2. Power-on the Streaming Tape.
3. Set the IPL Source switch on the Series/1 operator's control panel to the Alternate or Primary position, as applicable, to enable loading from the diskette.
4. Set the Mode switch on the Series/1 operator's control panel to the Diagnostic position.
5. Press the Load switch on the Series/1 operator's control panel.
6. Go to the designated Series/1 data entry console (Viking terminal, TTY terminal, etc.).

NOTE

Execution of the IPL sequence completes in approximately 10 seconds. A RDY ENTER message displayed on the CRT screen of the display unit (if used) and a 3800 (hexadecimal) code displayed in the register indicators of the operator's control panel indicates completion of the IPL sequence. If the Series/1 stops with any other code displayed, refer to the Common Halt List (in section 5) for corrective action.

7. Enter test number 5900 as follows to select and execute the Streaming Tape automatic diagnostics:
 - o If you are using the display/keyboard, enter B5900 and press the ENTER key (or the CR on a TTY).
 - o If you are using the operator/programmer panel, do the following:
 - a. Press the Data Buffer switch.
 - b. Enter B via the register input switches.
 - c. Press the Console Interrupt switch.
 - d. Press the Data Buffer switch.
 - e. Enter 5900 to select the Streaming Tape automatic diagnostics
 - f. Press the Console Interrupt switch twice.

8. The Streaming Tape automatic diagnostics execute in succession. If an error is detected during execution of the diagnostics, record the error message displayed and then go to the applicable maintenance instructions.

NOTE

Test 5910 may be run at this point to provide additional information.

9. When the diagnostics execute successfully, the Streaming Tape is ready for on-line operations.

INTERMITTENT ERRORS

In addition to the system error log, the following actions may be taken to detect/isolate intermittent errors:

1. Loop the diagnostic.
2. For random RBA data errors, loop test 7538.
3. For intermittent data errors at the same RBA, run SAU Verify to confirm the RBA and re-assign the RBA.

DIAGNOSTICS INFORMATION

The remainder of this section provides information on using the diagnostic monitor. Topics include configurator table information, the common halt list, and commands.

CONFIGURATOR TABLE INFORMATION

NOTE

The text uses the following conventions for operator/programmer panel input:

- (B) = Data Buffer switch
- (I) = Console Interrupt switch

Changing the Configurator Table Using the Operator/Programmer Panel

To change the configurator table using the operator/programmer panel, perform the following steps:

1. Press the Load switch to load the configurator program. If a 3801 error occurs, enter the following to continue to the next step:

(B),6,(I),(I)

2. View and record the configurator table contents per the following steps:
 - a. Press the Stop switch.
 - b. Press the SAR (Storage Address Register) switch.
 - c. Enter 3000 via the data register input switches.
 - d. Press the Store switch.
 - e. Press the Main Storage switch to display the first word of entry 00 in the configurator table. Record the contents.
 - f. Continue pressing the Main Storage switch to view and record each word of the entry.

NOTE

Each configurator table entry consists of eight words (refer to the following paragraphs for the entry format). Entry 00 is the system entry and entries 01 through XX are the device entries. The last entry in the table contains a 1 in the bit 2 position of byte 0203 as follows:

<div style="text-align: center;">02</div> <div style="text-align: center;">/--- ----/</div> <div style="text-align: center;">0010 0000</div>	<div style="text-align: center;">03</div> <div style="text-align: center;">/--- ----/</div> <div style="text-align: center;">0000 0000</div>
--	--

- g. Continue logging information from the configurator table until complete.
3. Press the Load switch. One of the following halts occurs: 382A (secure customer interface), 3822 (configurator errors on system), or 382E (option table available for entry). A 3801 halt appears if you configured the diskette for an alternate console that is not present. Enter the following to continue:

(B),6,(I),(I)

- a. If a 382A halt code occurs, enter the following to advance to halt 3822 or 382E:

(B),6, (I),(I)

- b. If a 3822 halt code occurs, enter the following to advance to halt 382E:

(B),1F,(I),(B),0300,(I),(I)

- c. If a 382E halt code occurs, go to step 4.

4. Enter one of the following options as applicable:
 - a. To delete an entry from the configurator table:
(B),1F,(I),(B),0200,(I),(I)
 - b. To change any portion of an entry in the configurator table:
(B),1F,(I),(B),0300,(I),(I)
 - c. To add a new entry in the configurator table:
(B),1F,(I),(B),0A00,(I),(I)
5. If a 383A halt code occurs (signifying selection of an 02 or 03 option), enter the table number as follows:
(B),1F,(I),(B),XX00,(I),(I)
Where: XX = entry number.
6. If a 383B or a 3846 halt code occurs (signifying selection of an 03 or 0A option), enter new configurator table data for table entries 01 through XX as follows:
(B),8F,(I),(B),AATT,(I),(B),0000,(I),(B),IDID,(I),(B),0000,
(I),(B),0000,(I),(B),0000,(I),(B),0000,(I),(B),IDID,(I),(I)
Where: AA = device address
TT = device type
IDID = device read ID
7. Repeat steps 4 through 6 until you complete all additions, deletions, and corrections.
8. To write the new configurator table on the diskette when complete (halt code 382E), enter:
(B),1F,(I),(B),0D00,(I),(I)
9. The next halt code is a 382C (copy table to another diskette?). Terminate the program by entering:
(B),1F,(I),(B),0500,(I),(I)
10. Halt code (ready) 3800 indicates successful termination of the configurator program.

The diskette is now configured and ready for diagnostic checkout.

Configure the System (Option 0C) Using the Operator/Programmer Panel

To configure the system automatically (with option 0C) using the operator/programmer panel, perform the following steps:

1. To load the configurator program, enter:

(B),B,(I),(B),38F0,(I),(I)

When the program is loaded, a 38XX halt code displays in the output indicators of the operator/programmer panel.

If a 382A or a 3801 halt code occurs, enter the following to continue:

(B),6,(I),(I)

2. If a 3822 halt code occurs, enter:

(B),1F,(I),(B),0300,(I),(I)

A 382E halt then occurs, allowing you to select an option.

3. To select configure system option 0C, enter:

(B),1F,(I),(B),0C00,(I),(I)

Refer to the following procedures for specific instructions pertaining to the displayed halt codes.

4. Continue entering the appropriate parameters until the panel displays halt code 3800 or 3805 which indicates completion of diskette configuration. You can now perform diagnostic checkout.

Configurator Table Entries

The configurator record contains system information (entry 00), and one entry for each device address used (entries 01-XX). Tables 5.11 and 5.12 list the formats used for the system entry and the device entries.

NOTE

Do not attempt to use an IBM configurator to construct the configuration table on a Cambex diagnostic diskette. All Cambex devices would be configured incorrectly in the table.

Entry 00 (System Entry)

Change only entry 00, bytes 05 through 09 (functions 04, 06, and 08). The configurator program enters all other information. Table 5.11 shows the system entry format.

Table 5.11 System Entry Format

Byte	Definition
00 and 01	Constant 00
02	Entry number of last entry in table
03	Configurator flags Bits 0 through 6 are reserved Bit 7 = 1 Diskette has been configured Bit 7 = 0 Diskette has not been configured
04	Not used
05	Processor type* 22 = 4592 25 = 4954 23 = 4953 25 = 4956 25 = 4955
06 and 07	Storage word <div><div>X Y Y Y</div><div>_____ ABBBBBBBBBBB</div><div>_____ A binary number indicating the number of 16K units of outer storage installed</div><div>_____ A = 0 No address translator A = 1 Address translator installed</div><div>_____ 3 = 16K of inner storage installed _____ 7 = 32K of inner storage installed _____ B = 48K of inner storage installed _____ F = 64K of inner storage installed</div></div> <div>Notes: 1. Storage word = F803 indicates 112K of total storage installed. 2. If BBBBBBBBBBBB is greater than 0, then A must equal 1 and the address translator feature must be installed. 3. Inner storage can be address only by the storage address register. 4. Outer storage can be addressed only by the address translator feature.</div>

Table 5.11 System Entry Format (cont.)

Byte	Definition
	5. Storage word = 7802 indicates one 32K card or two 16K cards installed as inner storage, one 32K or two 16K cards installed as outer storage, and the address translator installed.
08 and 09	Alternate console address and type (AATT)
0A and 0E	Not used
0F	Release level of this configuration record
<p>* The processor type is determined by the Cambex diagnostic program, therefore, this parameter is not relevant to the operation of the Certainty Series Diagnostic Tests.</p>	

Entries 01-XX (Device Entries)

Table 5.12 shows device entry format; table 5.13 lists the entries for various devices.

Table 5.12 Device Entry Format

Byte	Definition
00	Device address
01	Device type
02	<p>Flag byte</p> <p>Bit 0 is used by the DCP (in storage). The bit is always 0 on disk.</p> <p>Bit 1 = 1 indicates this entry is chained to next entry.</p> <p>Bit 2 = 1 indicates the last entry in configurator table.</p> <p>Bit 3 = 1 indicates the last entry in this sector.</p> <p>Bits 4 through 6 are reserved.</p> <p>Bit 7 is the last available entry in the configurator table.</p> <p>Notes:</p> <ol style="list-style-type: none"> 1. Ignore bits 2, 3, and 7 when making adds or changes. The configurator program sets/resets the bits at sort time. 2. Chain bit (byte 02 bit 1) is used to pass two or more entries to a MAP program or diagnostic. Improper use of the chain bit can cause MAP failures. For example: A missing chain bit causes needed information not to be available to the MAP; extra chain bits can cause MAPs to be bypassed during an auto run.
03 through 09	Device-dependent data. Describes the device to the associated MAPs/diagnostics. If the description is wrong, failures occur. The auto-verify is performed when the configurator load does not check device-dependent data.
0A through 0D	Reserved
0E through 0F	Device ID word

Table 5.13 Device Entries

Device Type and Device	Byte
	00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
Alternate Console Devices:	
TTY Console	DA 40 00 00 00 00 00 00 00 00 00 00 00 00 00 00 10
4979 Display Station *	DA 42 00 00 00 00 00 00 00 00 00 00 00 00 00 00 04 06
4978 Display Station	DA 45 00 00 00 00 00 00 00 00 00 00 00 00 00 00 04 0E
4974 Matrix Printer *	DA 62 00 00 00 00 00 00 00 00 00 00 00 00 00 00 02 06
80610 Display Station *	DA 42 00 00 00 00 00 00 00 00 00 00 00 00 00 00 04 06
80420/430 Matrix Printer **	DA 62 00 00 00 00 00 00 00 00 00 00 00 00 00 00 02 06
80440/450 Band Printer	DA 66 00 00 00 00 00 00 00 00 00 00 00 00 00 00 03 06
Communication Cards:	
RPQ	DA 81 00 00 00 00 00 00 00 00 00 00 00 00 00 00 2X 36
1310 MFA	DA E6 00 00 00 00 00 00 00 00 00 00 00 00 00 00 3X 36
1610 ACCA SL	DA E8 00 00 00 00 00 00 00 00 00 00 00 00 00 00 10 0E
2092 ACCA ML	DA E9 00 00 00 00 00 00 00 00 00 00 00 00 00 00 2X 0E
2906 FPM LC	DA EA 00 00 00 00 00 00 00 00 00 00 00 00 00 00 2X 16
Load Devices:	
4964 Diskette	DA 48 00 00 00 00 00 00 00 00 00 00 00 00 00 00 01 06
80210 Flexible Disk Drive ***	DA 46 00 00 00 00 00 00 00 00 00 00 00 00 00 00 01 06
4965 Diskette	DA 4B 00 00 00 00 00 00 00 00 00 00 00 00 00 00 52 12
4966 Diskette	DA 4A 00 00 00 00 00 00 00 00 00 00 00 00 00 00 01 26
80250-10 EMD Disk Drive	DA 75 00 00 00 00 00 00 00 00 00 00 00 00 00 00 3X 16

* Use device type 44 when configuring an IBM diskette.
 ** Use device type 64 when configuring an IBM diskette.
 *** Format also applies to 80240 series MMDs (contains a FDD packaged in the MMD enclosure).

COMMON HALT LIST

A lighted Wait indicator on the operator/programmer panel identifies a halt. The following paragraphs list and define halts for the diagnostic control program, configurator, and MAP diagnostic integration.

Diagnostic control program (DCP) halts are as follows:

Code	Description
3800	Ready -- enter any valid command.
3801	Bad condition code received from alternate console. Enter continue command: (B),6,(I),(I)
3802	Program check -- see MAP 3871.
3803	Machine check -- see MAP 3871.
3804	Power thermal warning.
3805	Program terminated -- enter any valid command.
3806	Invalid request -- enter any valid command.
3807	Alternate console is off during testing.
3808	Alternate console is on and the test is complete.
3809	Unexpected interrupt -- R0 level 3 contains the interrupt status byte. Location 180A contains the MAP number.
380A	Start -- the program has started.
380C	Program not found -- no VTOC entry exists for the requested program.
3810	Was not expecting reply (F command) data.
3813	Received a command sequence. To execute, press the console Interrupt switch. To delete the command, change the buffer contents and press the console Interrupt switch. The panel displays halt 3814 and you can reenter the command.
3814	Enter data.
3816	Change keyboard definition for 4978 display. Press any key within 15 seconds and halt 3817 displays.
3817	Press the key requested for keyboard definition.
FFFF	Control program accepts the command or reply.

CONFIGURATOR HALTS

The configurator halts are as follows:

Code	Description
3820	This diskette has not been configured before. Enter continue command: (B),6,(I),(I)
3821	Enter alternate console device address and device type, for example: To assign TTY as an alternate console, enter: (B),1F,(I),(B),0040,(I),(I) To assign programmer panel as alternate console, enter: (B),1F,(I),(B),0000,(I),(I)
3822	A configuration error occurred on the system. Reply with one of the following: 01 = Terminate 02 = Print all errors 03 = Print options 04 = Bypass TCS errors (B),1F,(I),(B),XX00,(I),(I) where XX = chosen option.
3823	Invalid entry. Enter the correct entry.
3826	Changes not saved. Enter 0D to save the configuration table: (B),1F,(I),0D00,(I),(I) Enter 05 to terminate (changes made are lost): (B),1F,(I),0500,(I),(I)
3827	Enter correct processor type: 22 = 4952 processor 25 = 4954 processor 23 = 4953 processor 25 = 4956 processor 25 = 4955 processor (B),1F,(I),(B),XX00,(I),(I) where XX = processor type.
3828	Device address or type incorrectly entered. Enter correct parameter.
3829	Alternate console not found. This is a warning message. If the console is a printer or a programmer console, enter 6 to continue.

Code	Description
382A	Secure the customer interface. When the customer interface is secure, enter the continue command as follows: (B),6,(I),(I)
382B	Is an OEMI card installed? Reply 00 = no, 01 = yes. (B),1F,(I),(B),0000 or 0100,(I),(I)
382C	Copy configuration table to another diskette? Reply 0D to copy the table or 05 to terminate.
382D	Is floating-point feature installed? Reply 00 = no, 01 = yes. (B),1F,(I),(B),0000 or 0100,(I),(I)
382E	Option table is available for entry. Enter option table information per the following: <div style="margin-left: 40px;"> 01 = Print table 02 = Delete 03 = Change 04 = Alternate console (see note) 05 = Terminate 06 = Processor type 07 = Two-channel switch 08 = Storage size 09 = Print system equipment 0A = Add 0B = Bypass option table 0C = Configure system (see note) 0D = Diskette write (see note) 0E = OEMI 0F = Floating-point 10 = Combine </div> (B),1F,(I),(B),XX00,(I),(I) where XX = chosen option Note: Follow a new alternate console definition or system configuration with a diskette write to save the new information on the diskette.
382F	Initial auto configuration. The diskette has an alternate console assigned. Complete the initial auto configuration. Enter 6 to continue: (B),6,(I),(I)
3831	Enter station address ID = XY where: X = cable address (0-3), Y = station address (0-3).

Code	Description
3832	Programmer or CE console is the assigned alternate console. Enter 6 to continue: (B),6,(I),(I)
3833	OIO (Operator I/O) condition code. R3 = condition code, R4 = AATT where: AA = device address and TT = device type.
3834	Error. More than one two-channel switch disappeared after a select switch was changed. If there is no alternate console, enter 6 to continue: (B),6,(I),(I)
3835	Interrupt condition code. R3 = interrupt condition code, R4 = AATT where: AA = device address and TT = device type.
3836	Is customer using a common I/O? Reply 00 = no, 01 = yes. (B),1F,(I),(B),0000 or 0100,(I),(I)
3837	Error. A two-channel switch did not disappear after you changed a select switch. If there is no alternate console, enter 6 to continue: (B),6,(I),(I)
3838	RPQ diagnostics are installed on the system.
383A	Select the entry number in the configurator table to be altered as follows: (B),1F,(I),(B),XX00,(I),(I) Where: XX = table entry number.
383B	Enter the desired entry. The format is as follows: AATT,(I),(B),0000,(I),(B),IDID,(I),(B),0000,(I), (B),0000,(I),(B),0000,(I),(B),0000,(I),(B),IDID Where: AA = device address TT = device type IDID = device read ID code (B),8F,(I),(B), entry per above,(I),(I)
383C	Error. The system cannot find the reflected two-channel switch. If there is no alternate console, enter 6 to continue: (B),6,(I),(I)

Code	Description
383D	<p>Insert the FROM diskette that is used with the merge function (10) and the print configuration function (20). Insert the FROM diskette in the disk unit and answer 01 when completed:</p> <p>(B),1F,(I),(B),0100,(I),(I)</p>
383E	<p>Insert the Basic diskette that is used with the merge function (10) and the print configuration function (20). Remove the From diskette, insert the Basic diskette, and answer 01 when completed:</p> <p>(B),1F,(I),(B),0100,(I),(I)</p>
3840	<p>Error. A device is in the hardware, but not in the configuration table. Level 3, R3 contains the address (AA00). Level 3, R4 contains the ID word. Record the contents of R3 and R4. Enter the continue command:</p> <p>(B),6,(I),(I)</p>
3841	<p>Error. A device is in the table, but not in the hardware. Level 3, R3 contains the device address and configuration table entry number (AAEE). Record the contents of R3 and enter the continue command:</p> <p>(B),6,(I),(I)</p>
3842	<p>Error. The ID word received does not match the ID word stored in the configurator table for this address. Level 3, R3 contains the device address and configuration table entry number (AAEE). Level 3, R4 contains the ID word received. Record the contents of R3 and R4. Enter the continue command:</p> <p>(B),6,(I),(I)</p>
3843	<p>Error. An entry in the configurator table has a device type and device ID that do not match. Level 3, R3 contains the device address and configuration table entry number (AAEE). Record the contents of R3 and enter the continue command:</p> <p>(B),6,(I),(I)</p>
3844	<p>Error. The system received a bad condition code in response to a Read ID command. Level 3, R3 contains the device address and condition code (AACC). Record the contents of R3 and enter the continue command:</p> <p>(B),6,(I),(I)</p>

Code	Description
3845	Error. A two-channel switch was in the wrong position. If there is no alternate console, enter 6 to continue: (B),6,(I),(I)
3846	Enter new configurator table data as follows: (B),8F,(I),(B),0001,(I),(B),0203,(I),(B),0405,(I),(B),0607, (I),(B),0809,(I),(B),0A0B,(I),(B),0C0D,(I),(B),0E0F,(I),(I)
3848	Error. The entries do not agree. R1 = entry address of From table, R2 = entry address of To table.
3849	Alternate console error. The response from the alternate console to a Read ID command does not match that of a supported console device. Level 3, R3 contains the device address and type read from the configurator table (AATT). R4 contains the response from the read ID command. Record R3 and R4. Enter continue command: (B),6,(I),(I) The control program displays halt 382E. If R3 has the correct device address and type for the alternate console, the console is returning a bad ID. Enter: (B),1F,(I),(B),0500,(I),(I) The configurator then terminates at halt 3800. Enter the assign programmer console command: (B),0005,(I),(I) This disables the alternate console. If R3 does not contain the correct information, change the alternate console bytes at address 3008 and 3009 to the address and type for the console device. To write the record to the diskette, enter: (B),1F,(I),(B),0D00,(I),(I)
384A	The configuration table is full.
384B	The configuration chain (byte 02, bit 1) is too long. See MAP 3880.
384C	Configuration display message. See the alternate console display for the message.
384D	The VTOC does not contain a configurator table (U38F1). Load the general utility program (38F9) and copy 38F1 from another diskette.

Code	Description
384F	Duplicate address AA, entry EE and EE. The configurator table has a duplicate address. If there is no alternate console assigned, level 3, R2 has the device address and R3 and R4 have the table entry numbers. Enter 6 to continue: <div style="margin-left: 100px;">(B),6,(I),(I)</div>
3850	Enter the inner storage size: <div style="margin-left: 100px;">03 = 16K 07 = 32K 0B = 48K 0F = 64K</div> <div style="margin-left: 100px;">(B),1F,(I),(B),XX00,(I),(I)</div> <div style="margin-left: 100px;">Where: XX = 03, 07, 0B, or 0F</div>
3851	Is address translator installed? Reply 01 = yes, 00 = no. <div style="margin-left: 100px;">(B),1F,(I),(B),0000 or 0100,(I),(I)</div>
3852	Enter the outer storage size. OXXX = decimal number of 16K outer storage blocks. <div style="margin-left: 100px;">(B),1F,(I),(B),0XXX,(I),(I)</div>
3853	ACCA SL is installed (asynchronous control communications adapter, single line). See MAP 13.
3854	ACCA ML is installed (asynchronous control communications adapter, multiline). See MAP 13.
3855	BSCA SL is installed (bisynchronous communications adapter, single line). See MAP 13.
3856	BSCA ML is installed (bisynchronous communications adapter, multiline). See MAP 13.
3857	SDLC is installed (synchronous data link control). See MAP 13.
3858	Error. The specify code entered is not correct.
3859	Error. The specify code entered is correct but does not match the card.
385B	Error. A multiline controller has an address domain. See MAP 13.
385C	Error. No interrupt. See MAP 13.

Code	Description
385D	Two-channel switch console message. Change the select switch to the processor you are using. See MAP 13.
385E	Two-channel switch console message. There is more than one two-channel switch console installed. See MAP 13.
385D	Two-channel switch console message. There is at least one two-channel switch console installed. See MAP 13.
3860	Programmable communications subsystem error message. See MAP 13.
3861	Programmable communications subsystem error message. See MAP 13.
3862	Programmable communications subsystem entry. See MAP 13.
3863	Is alternate console being used installed as common I/O? Reply 00 = no, 01 = yes. (B),1F,(I),(B),0000 or 0100,(I),(I)
3864	Is a programmer or CE console installed on the processor being used? Reply 00 = no, 01 = yes. (B),1F,(I),(B),0000 or 0100,(I),(I)
3865	Is alternate console being used installed in the farthest common I/O? Reply 00 = no, 01 = yes. (B),1F,(I),(B),0000 or 0100,(I),(I)
3866	The alternate console disappeared after the two-channel switch was changed. See MAP 13.
3867	The alternate console did not appear after the two-channel switch was changed. See MAP 13.
3868	The alternate console did not disappear after the two-channel switch was changed. See MAP 13.
3869	Obtain a programmer or CE console. The configuration program needs a programmer or CE console to continue. The configuration program has been terminated.
386A	ML COMM is installed (multiline communication). See MAP 13.
386B	Tape device is installed. 00 = NRZ1, 01 = dual, FF = PE.
386C	Multifunction attachment is installed. See MAP 13.

MAP Diagnostic Integration Halts

MAP diagnostic integration (MDI) halts are as follows:

Code	Description
------	-------------

3C01	Enter the address of the device to be tested.
------	---

From the operator/programmer panel, enter:

(B),1F,(I),(B),XX00,(I),(I)

From an alternate console, enter:

FXX

3C05	Enter the starting step number for the loop.
------	--

From the operator/programmer panel, enter:

(B),1F,(I),(B),XXXX,(I),(I)

From an alternate console, enter:

FXXXX

3C06	Enter the ending step number for the loop using the same procedure as halt 3C05.
------	--

3C08	The device at the address entered in halt 3C01 is not the type address tested by the requested program. Enter the correct address.
------	--

3C0E	No device of that type was found in the configurator table, or the MAP executed and attempted to load a MAP not in VTOC.
------	--

COMMANDS

This subsection describes commands as they would be entered from the operator/programmer panel. Enter these same commands from an alternate console by keying in the command character followed by data, where applicable, and pressing the ENTER key (Carriage Return key on TTY). The commands do not require commas.

Single-Character Commands (No Data)

Enter the single-character commands, where: (B) = Data Buffer key and (I) = Console Interrupt key as follows:

<u>Command</u>	<u>Key Sequence</u>	<u>Result</u>
5	(B),5,(I),(I)	Disable alternate console and assign operator/programmer panel.
6	(B),6,(I),(I)	Continue program execution
9	(B),9,(I),(I)	Terminate program
A	(B),A,(I),(I)	Start execution
0	(B),0,(I),(I)	Answer question 'no' (see note)
1	(B),1,(I),(I)	Answer question 'yes' (see note)

Enter the commands in bits 12 through 15 of the data buffer.

Note: Commands 0 and 1 apply to test program responses only. Use the F command to answer 'yes' or 'no' to a question in a utility program, for example: F1 = yes, F0 = no.

Commands That Use a Program ID (Commands B and C)

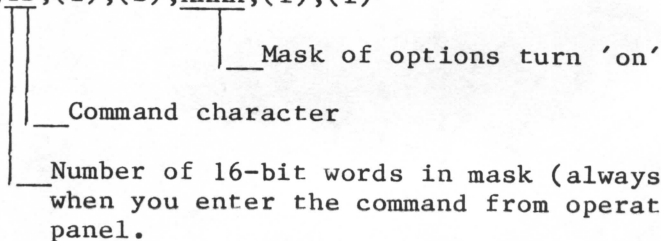
Commands B and C load a program. Enter the program ID (XXXX) with the command character as follows:

<u>Command</u>	<u>Key Sequence</u>	<u>Result</u>
B	(B),B,(I),(B),XXXX,(I),(I)	Program XXXX loads and goes.
C	(B),C,(I),(B),XXXX,(I),(I)	Program XXXX loads and waits for option selection command D.

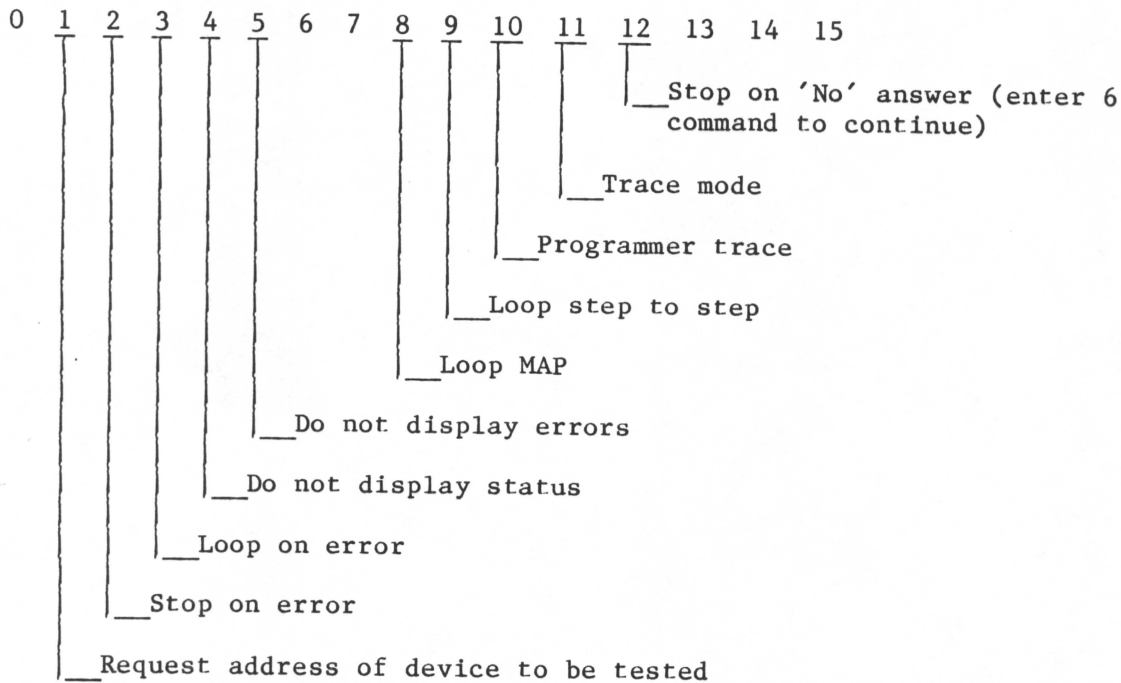
Command To Set Option Bits On (Command D)

Enter command D to set the option bits on as follows:

(B),1D,(I),(B),XXXX,(I),(I)



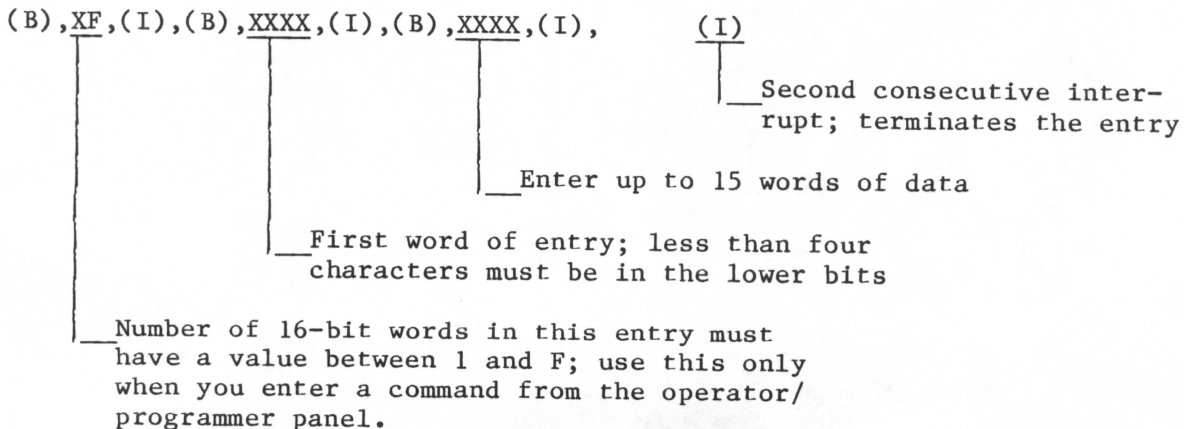
Option bits are as follows:



Follow the D command with the A command to start the execution of the program.

Command To Enter Variable Data (Reply to a Program), (Command F)

Enter command F with variable data (reply to a program) as follows:



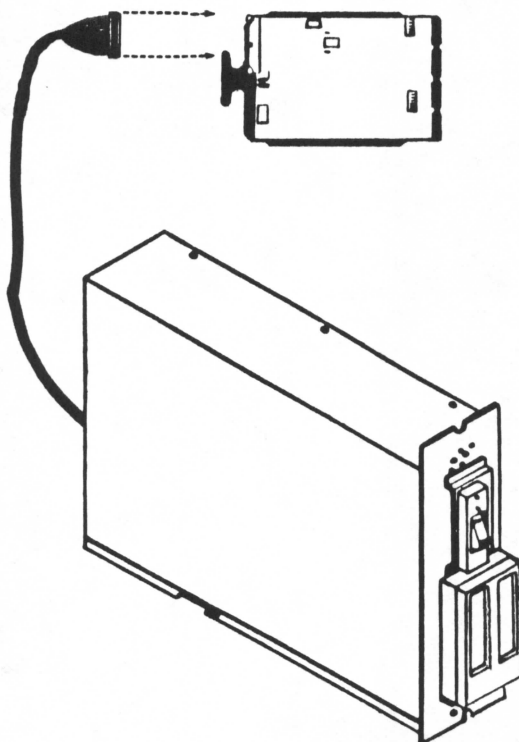


Figure 1.0 80820-10 Streaming Tape Subsystem

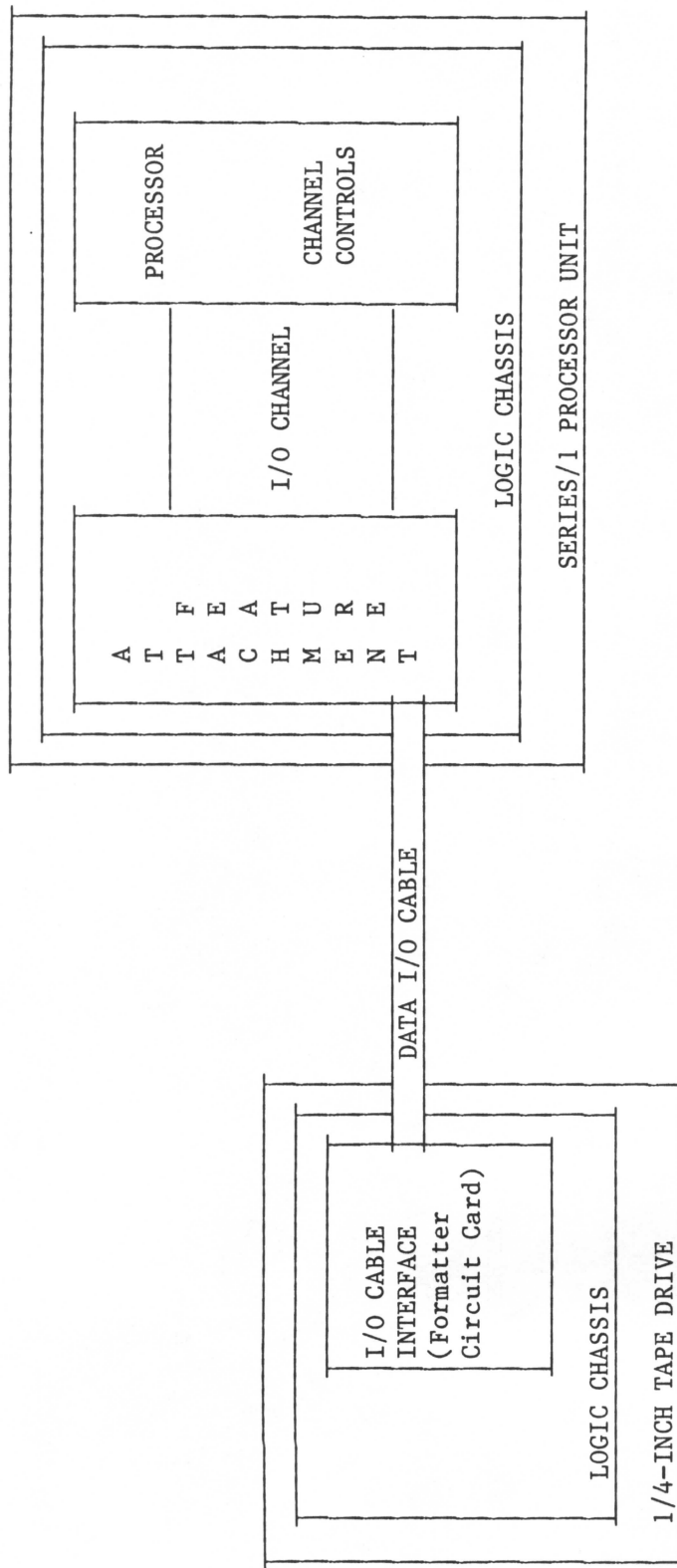


Figure 1.31 80820-10 Block Diagram

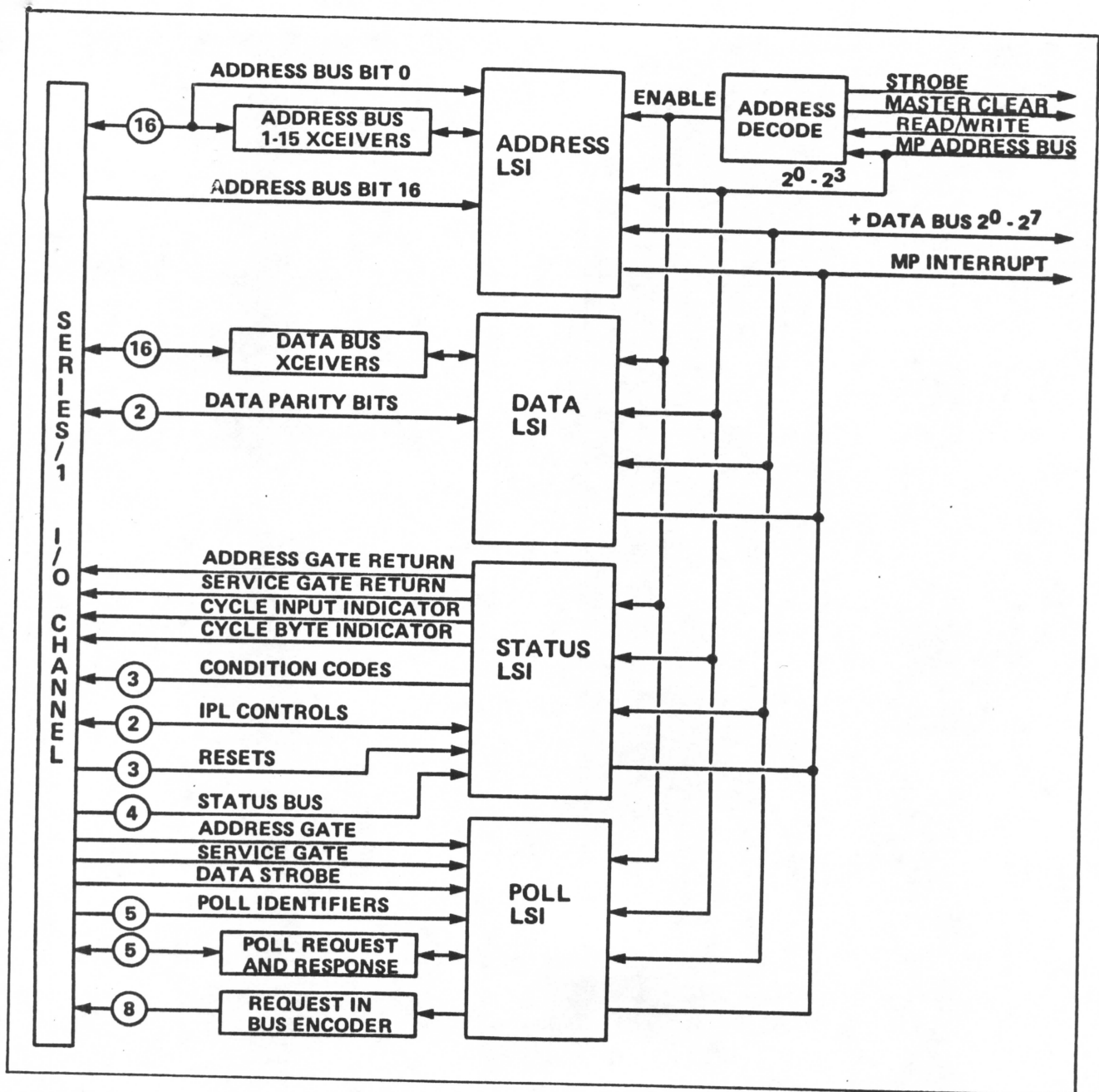


Figure 2.10 Attachment Card Block Diagram

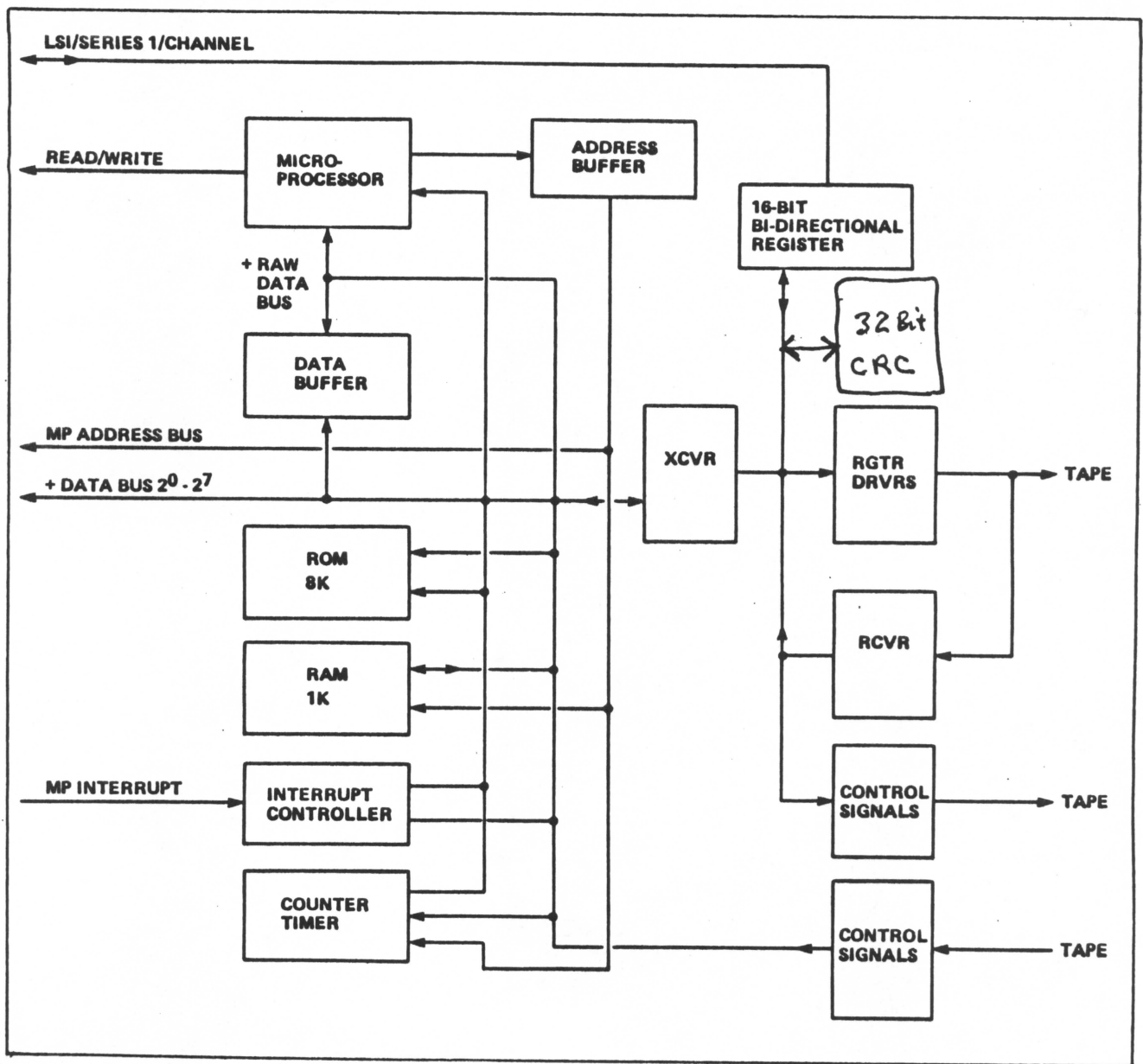


Figure 2.10 Attachment Card Block Diagram (part 2)

Immediate Device Control Block (IDCB)

	COMMAND FIELD								DEVICE ADDRESS FIELD							
IDCB BITS	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ADDRESS BUS BITS	0							7	8							15
	0							7	8							15

IMMEDIATE DATA FIELD (IMMEDIATE DATA WORD/ZEROS/DCB ADDRESS)															
IDCB BITS	16													31	
DATA BUS BITS	0													15	

Figure 2.11 Immediate Device Control Block

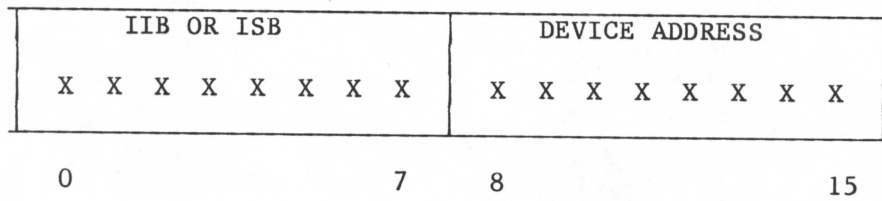


Figure 2.12 Interrupt IIB or ISB

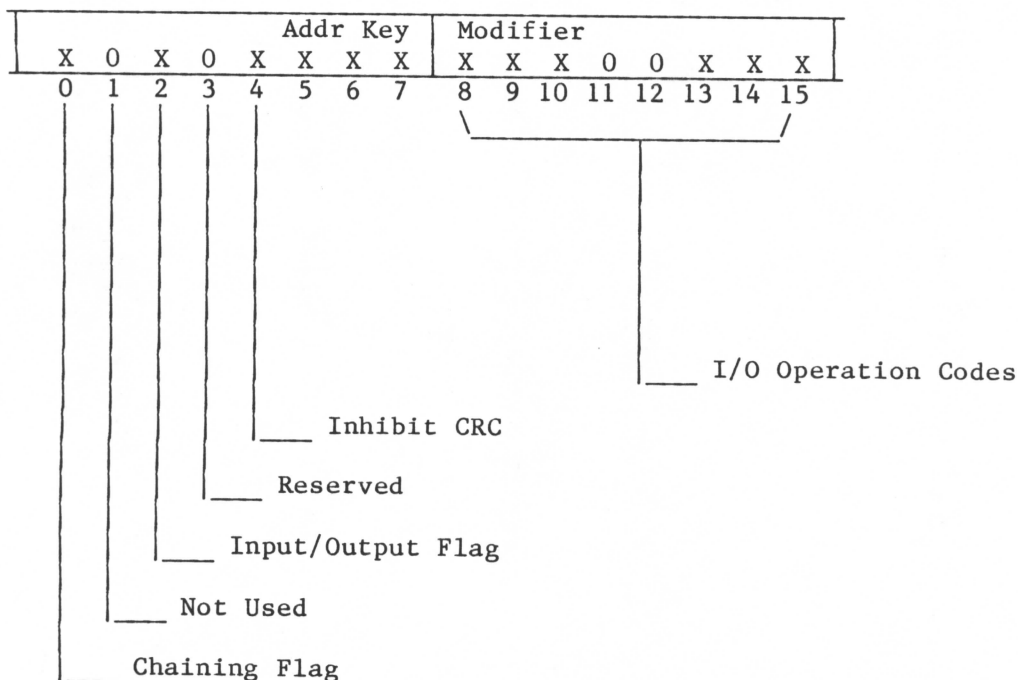
DCB (Device Control Block)

Word 0	Control Word
Word 1	Not Used
Word 2	Not Used
Word 3	Not Used
Word 4	Reserved for diagnostics
Word 5	Chain address (next DCB address)
Word 6	Byte Count
Word 7	Starting address of data storage address

DCB bits --	0	7 8	15
Data bus bits --	0	7 8	15

Figure 2.13 Device Control Block

DCB Control Word (DCB Word 0)



DCB control word bit significance is as follows:

- o Bit 0 is checked only if the command in the IDCB was a START command.
- o Bits 1 and 3 are not used and are set to a logical 0.
- o Bit 2 is an input/output indicator. If bit 2 is a logical 0, the direction of data flow for the operation is from main processor storage. If bit 2 is a logical 1, data flow is to main processor storage.
- o Bit 4, when set to a logical 1, is used to inhibit CRC checking during save and restore operations.
- o Bits 5, 6, and 7 contain a storage access authorization key used during a data transfer to main processor storage. If the key is not a valid key, a protect check occurs (bit 6 of the ISB is set to a logical 1).
- o Bits 8 through 15 contain the various I/O operation codes.

Figure 2.14 DCB Word 0

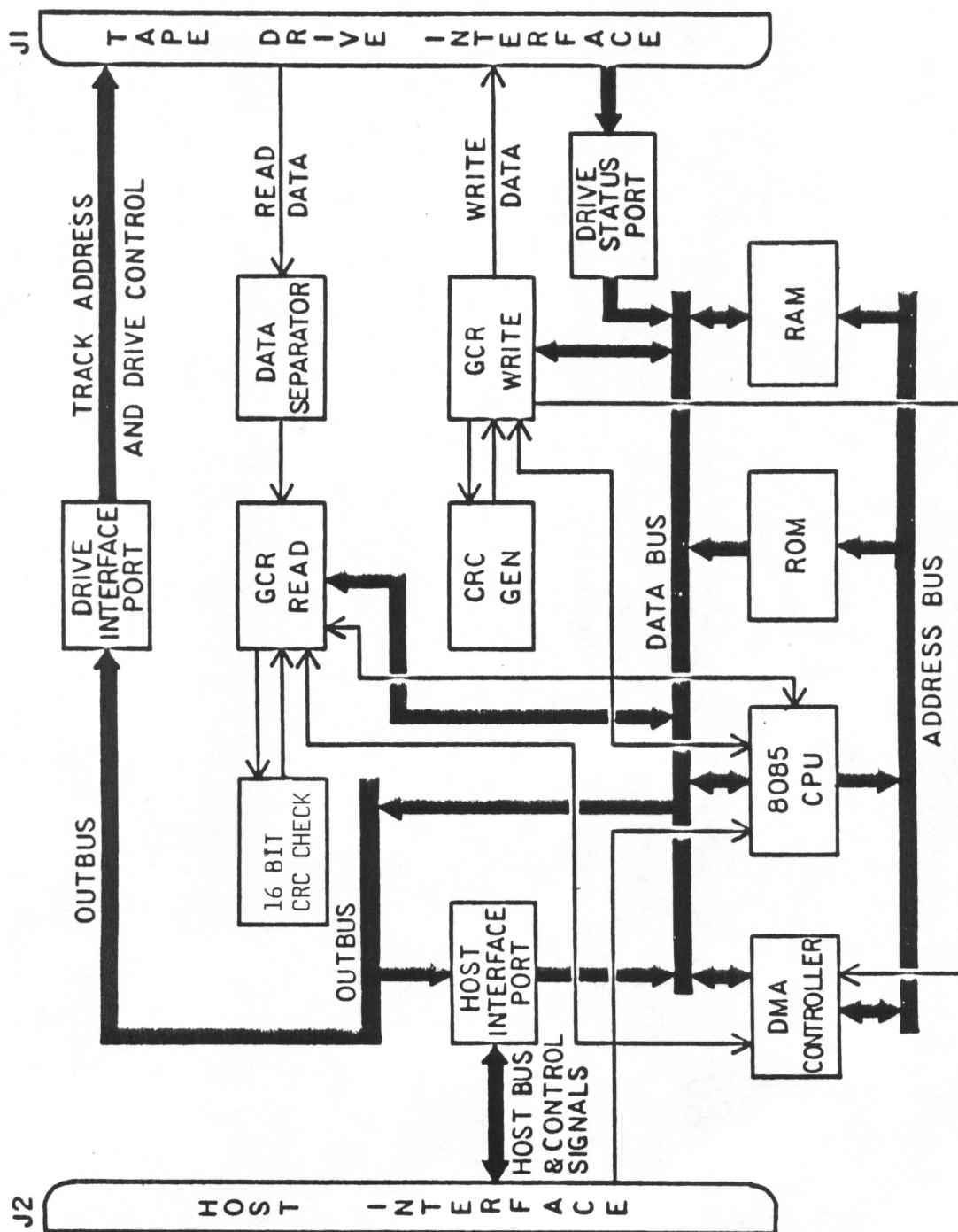


Figure 2.20 Drive Formatter Block Diagram

I/O PIN ASSIGNMENT - HOST ADAPTER (J2)

PIN #	MNEMONIC	TO	DESCRIPTION
02-10	N/A		Reserved for future use
12	HB7-	B	Host Bus Bit #7, MSB
14	HB6-	B	Host Bus Bit #6
16	HB5-	B	Host Bus Bit #5
18	HB4-	B	Host Bus Bit #4
20	HB3-	B	Host Bus Bit #3
22	HB2-	B	Host Bus Bit #2
24	HB1-	B	Host Bus Bit #1
26	HBO-	B	Host Bus Bit #0, LSB
28	ONL-	F	Online
30	REQ-	F	Request
32	RSTC-	F	Reset Controller
34	XFR-	F	Transfer
36	ACK-	H	Acknowledge
38	RDY-	H	Ready
40	EXC-	H	Exception
42	DIR-	H	Direction
44-50	N/A		Reserved for future use

NOTE: All odd pins are signal returns, which should be connected to ground at both the drive, and the SBF. B=Bi-directional, F=SBF, H=Host.



Figure 2.21 QIC 02 Interface

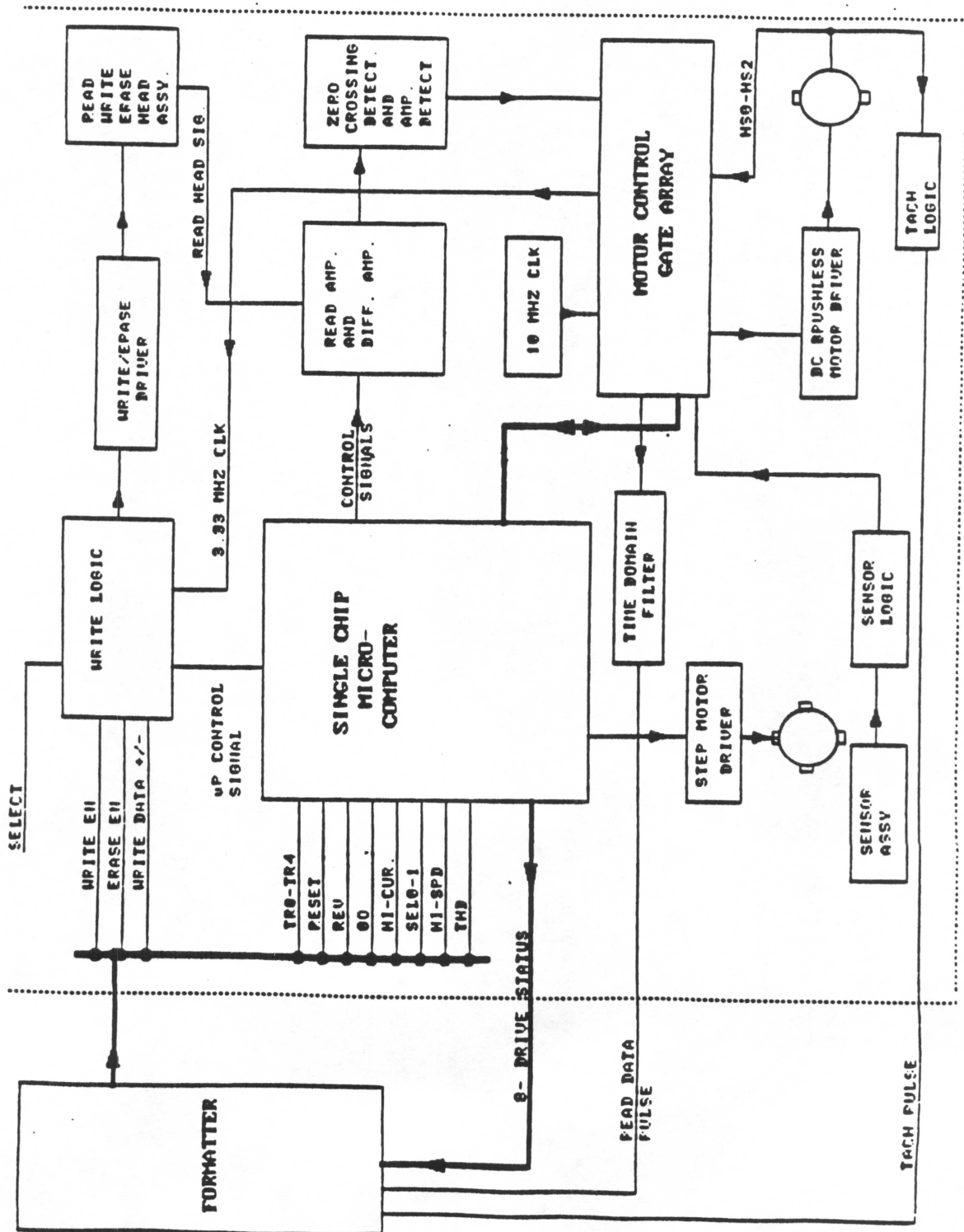
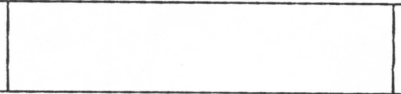


Figure 2.30 Tape Drive Block Diagram

INTERFACE I/O PIN ASSIGNMENTS			
PIN #	MNEMONIC	TO	DESCRIPTION
02	GO	D	Motion control for the Capstan Motor
04	REV	D	Direction Control for the Capstan Motor
06	TR3	D	Track Select Bit 3
08	TR2	D	Track Select Bit 2
10	TR1	D	Track Select Bit 1
12	TRO	D	Track Select Bit 0
14	RST	D	Drive Reset
16	FLT	F	Drive Fault Status
18	TR4	D	Track Select Bit 4 (Off Track Seek)
20	DS1	D	Drive Select #1 Control
22	DS0	D	Drive Select #0 Control
24	HC	D	High Write Current Select
26	RDP	F	Read Data Pulse Output
28	UTH	F	Upper Tape Hole Position Code
30	LTH	F	Lower Tape Hole Position Code
32	SEL	F	Drive Selected Response
34	CIN	F	Cartridge in Response
36	USF	F	Unsafe Cartridge Response
38	TCH	F	Tachometer Output Pulse
40	WDA	D	Write Data Signal
42	WDA+	D	Write Data Signal (inverse)
44	THD	D	Threshold Level
46	HSD	D	High Speed Select Control
48	WEN	D	Write Enable Control
50	EEN	D	Erase Enable Control

* NOTE: All odd pins are signal ground returns which should *
* be connected to ground at both the drive (D) and formatter (F) *
* All signals are low active, LOW=True, HIGH=False. *

Drive Formatter Connector



Tape Drive Connector

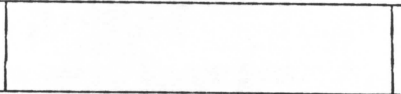


Figure 2.31 QIC 36 Interface

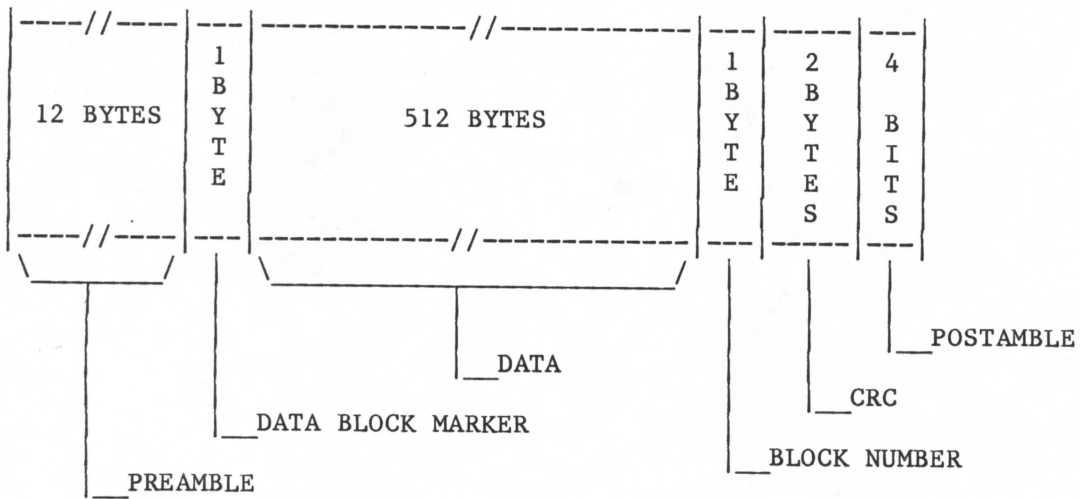
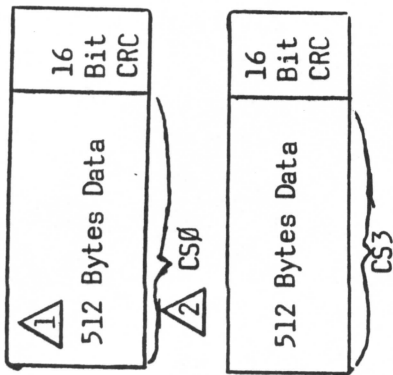
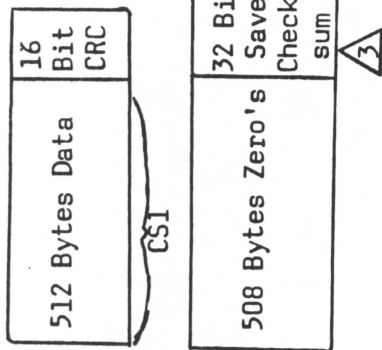


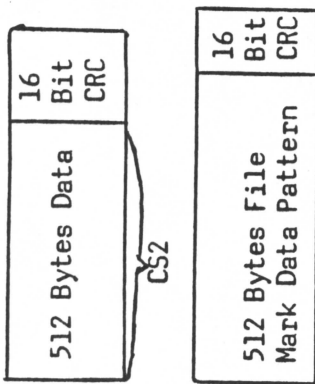
Figure 2.40 Data Block Format



Last Data Block



Attachment Card Checksum Block



File Mark Block

- ① Two disk sectors are stored per data block on tape
- ② $CS_n = 32 \text{ bit checksum (Polynomial } X^{32} + X^{28} + X^{26} + X^{19} + X^{17} + X^{10} + X^6 + X^2 + 1)$
- ③ $32 \text{ Bit save checksum} = CS_0 + CS_1 + CS_2 + CS_3$

Figure 2.41 80820-10 Tape Format

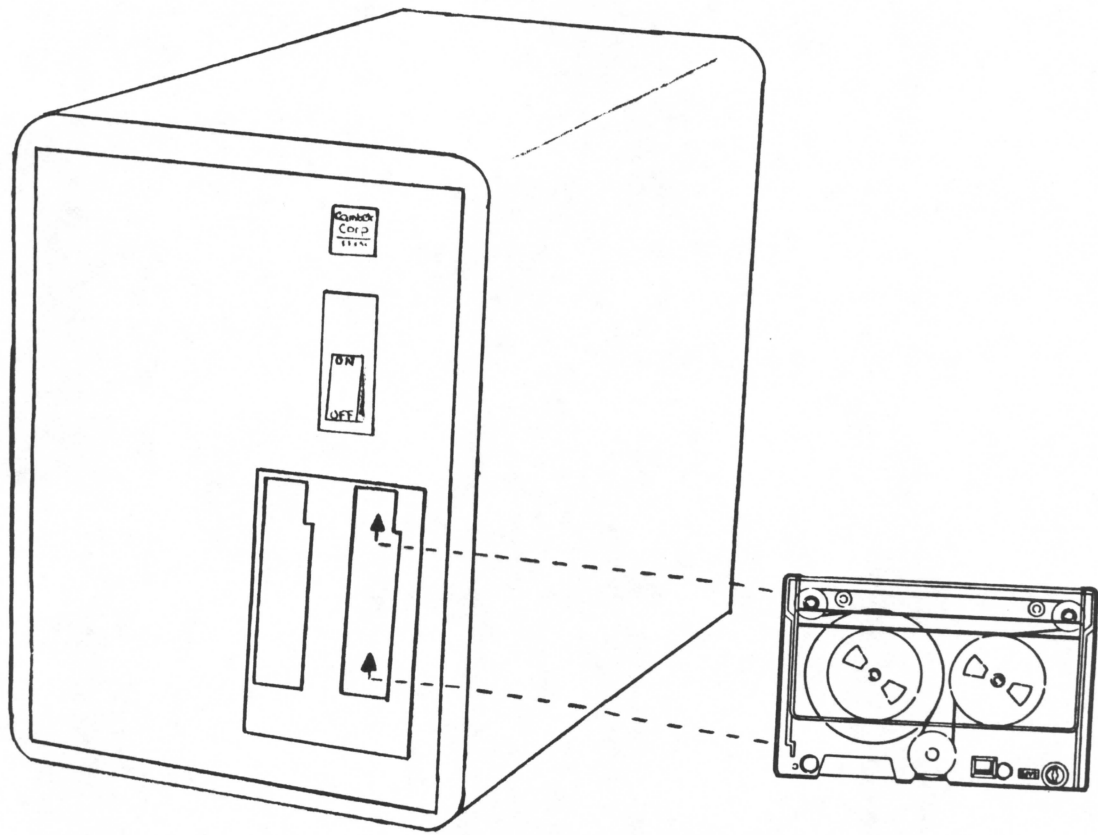


Figure 2.42 Cartridge Loading

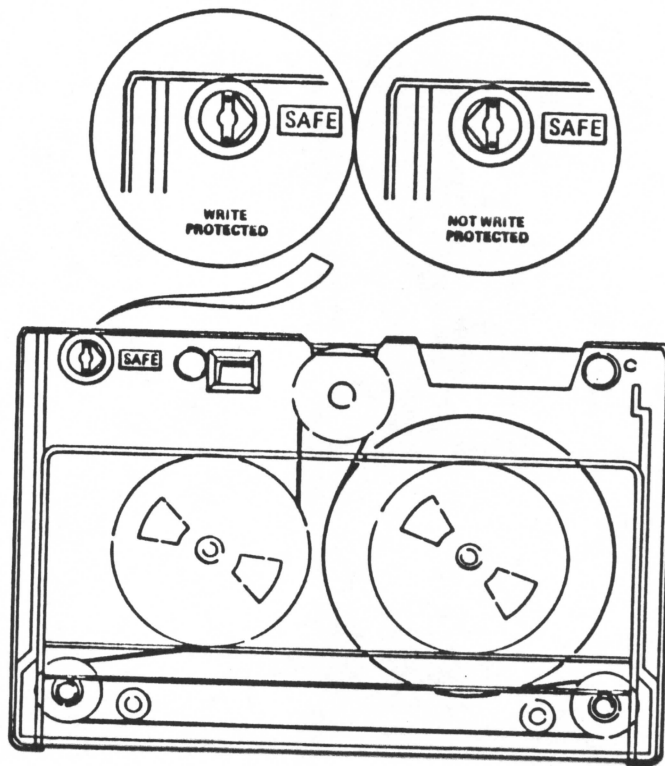


Figure 2.43 Write Protect Feature

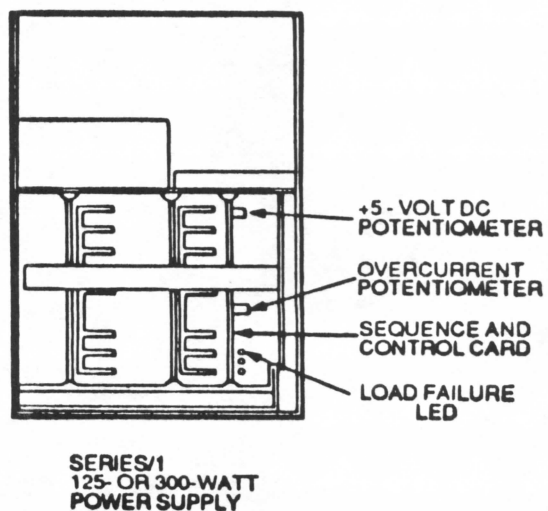
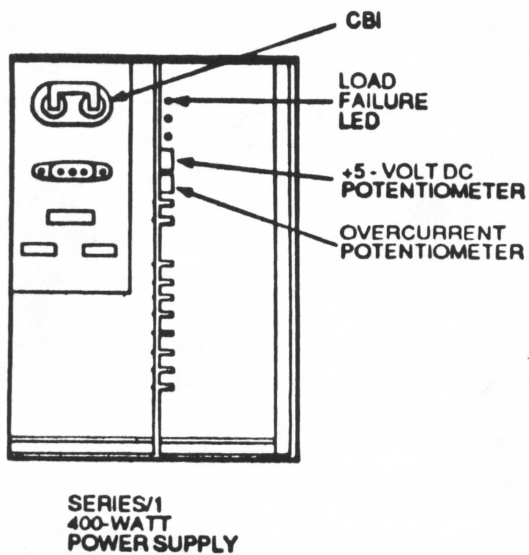
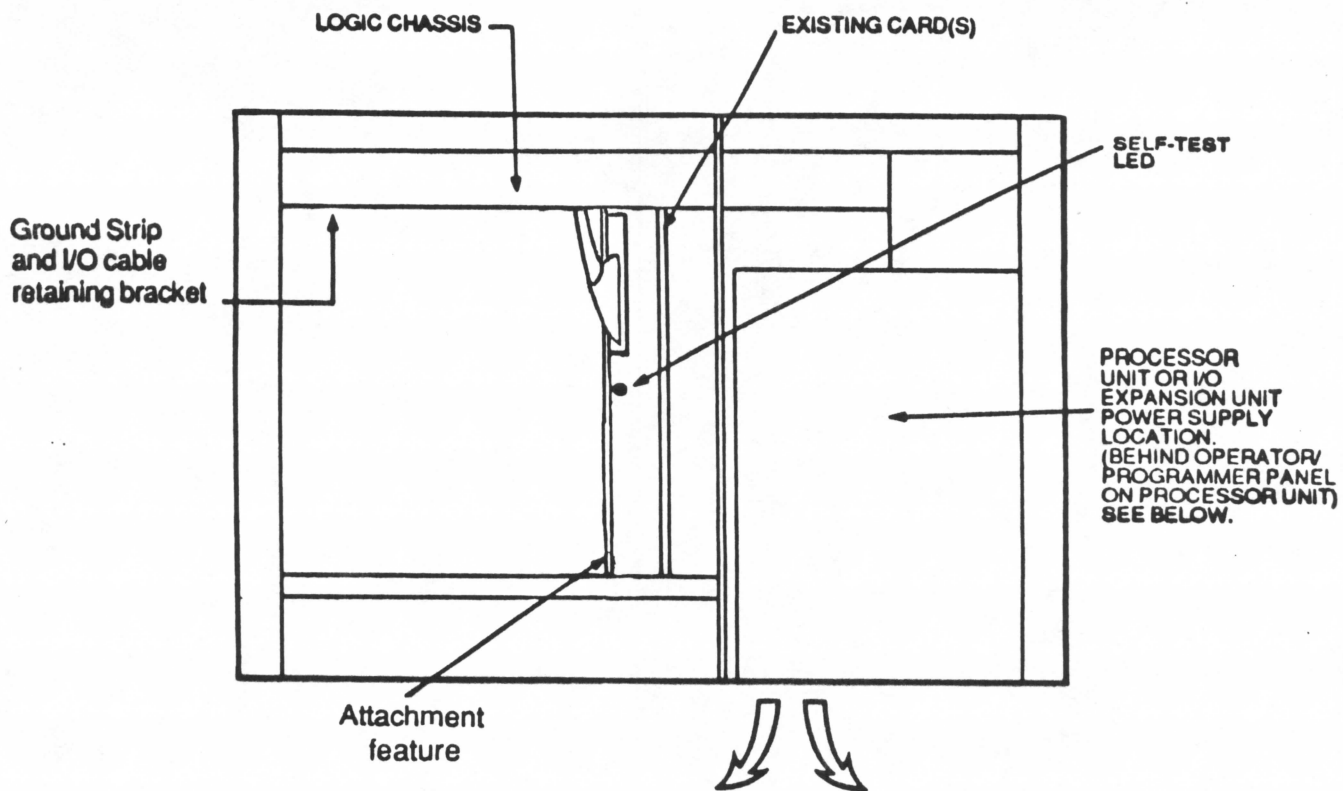
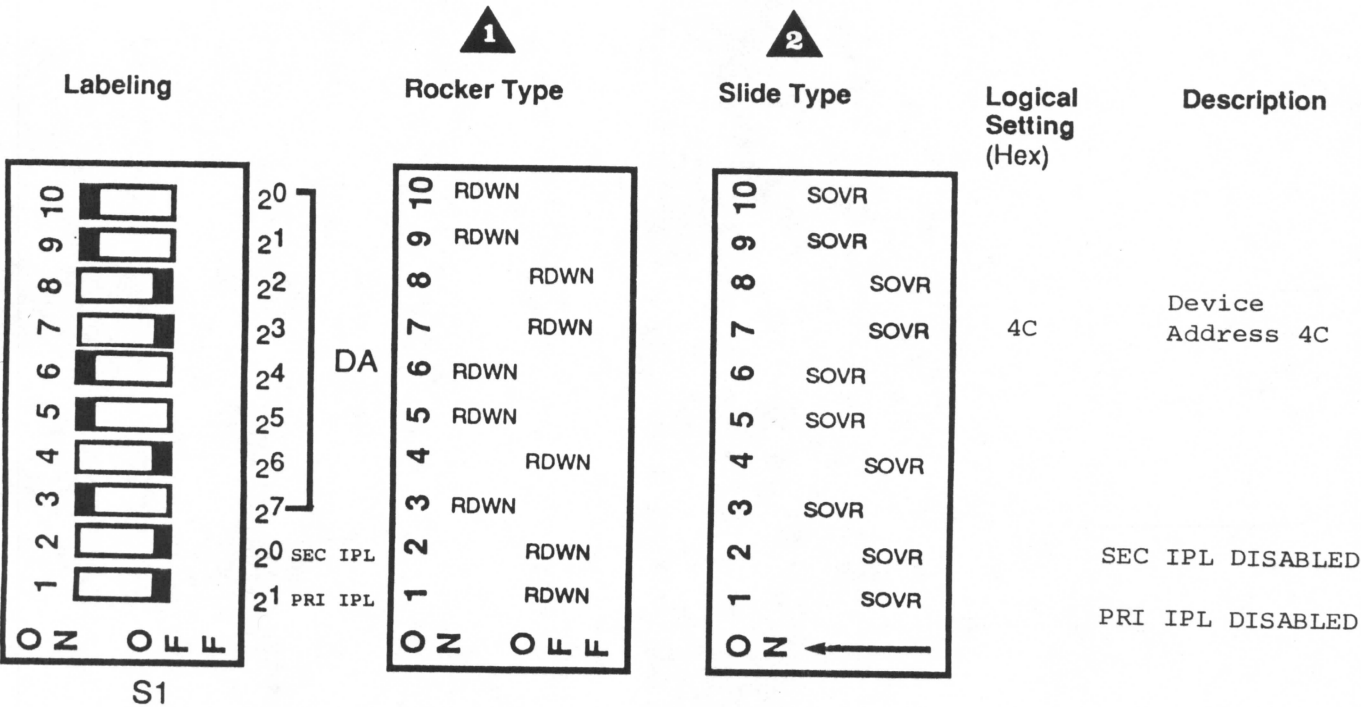


Figure 3.3.5 Cable Locations and Series/1 Power Adjustments

Attachment Card Device Address and Switch

Mechanical Setting



- 1** Push Rocker Down (RDWN) to actuate position
- 2** Push Slide Over (SOVR) to actuate position

Figure 3.3.7 Streaming Tape Attachment Card Switch Settings

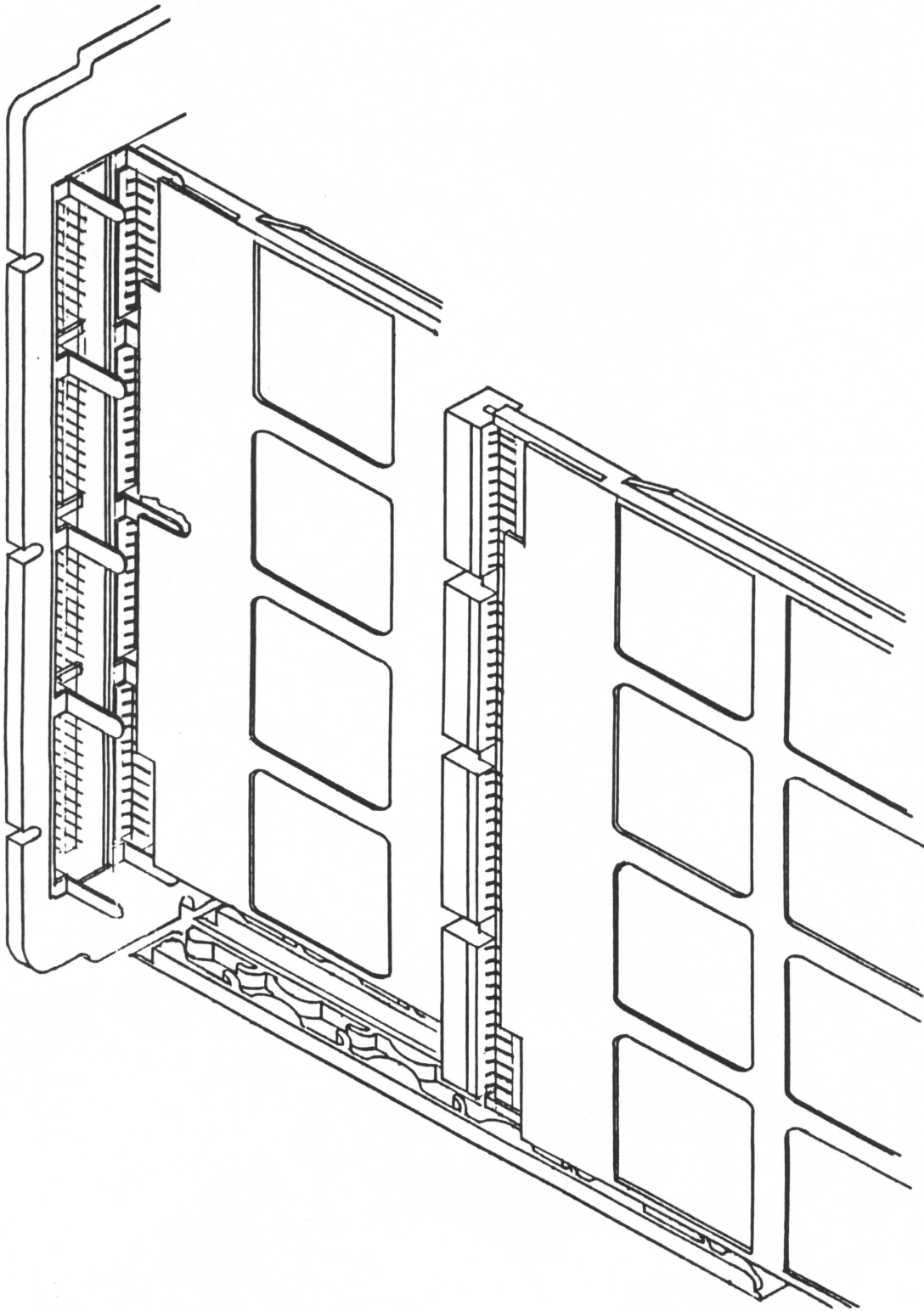


Figure 3.3.8 Backpanel Guide Pins & Sockets

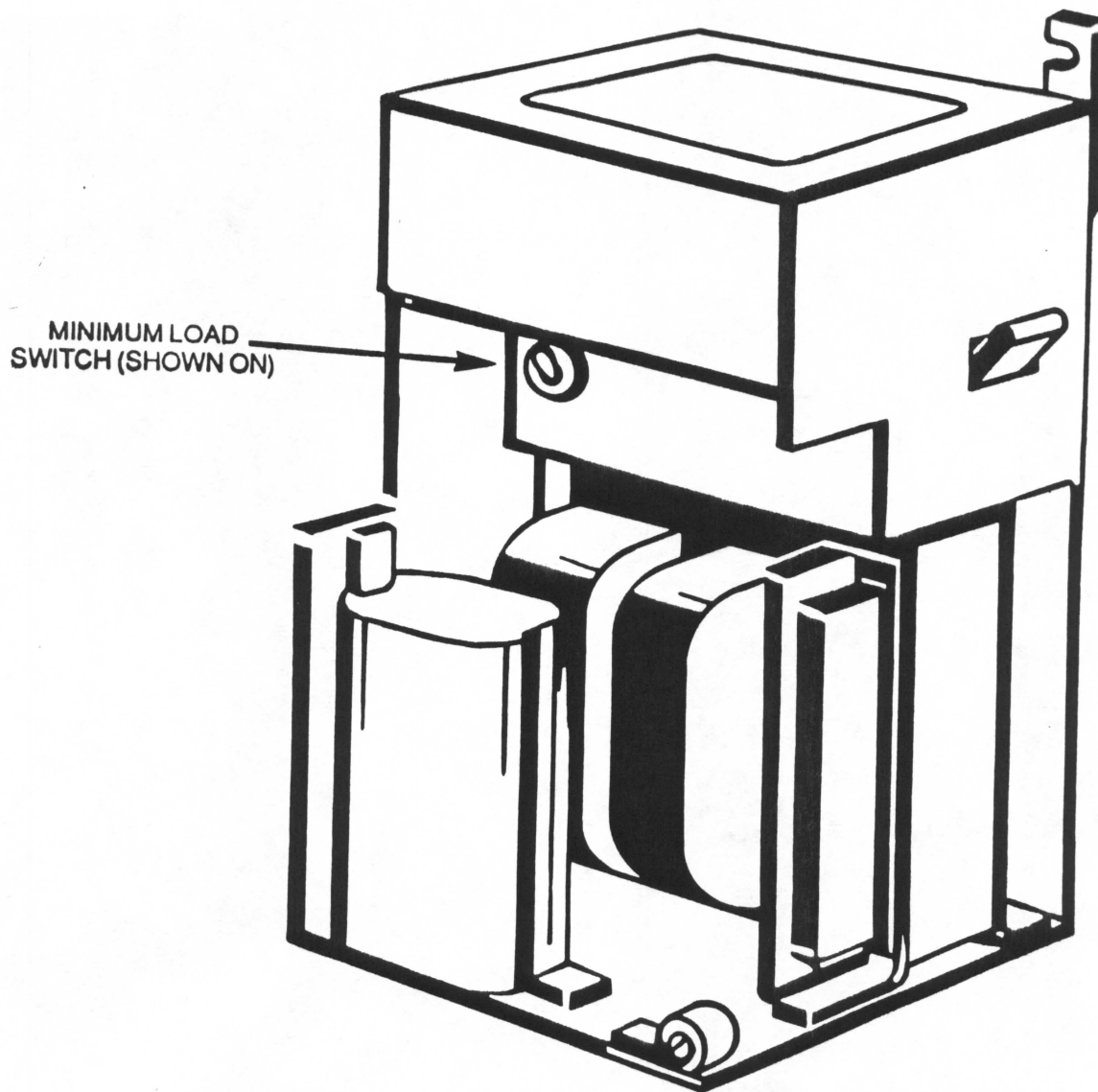


Figure 3.3.12 Model 4952A Power Supply

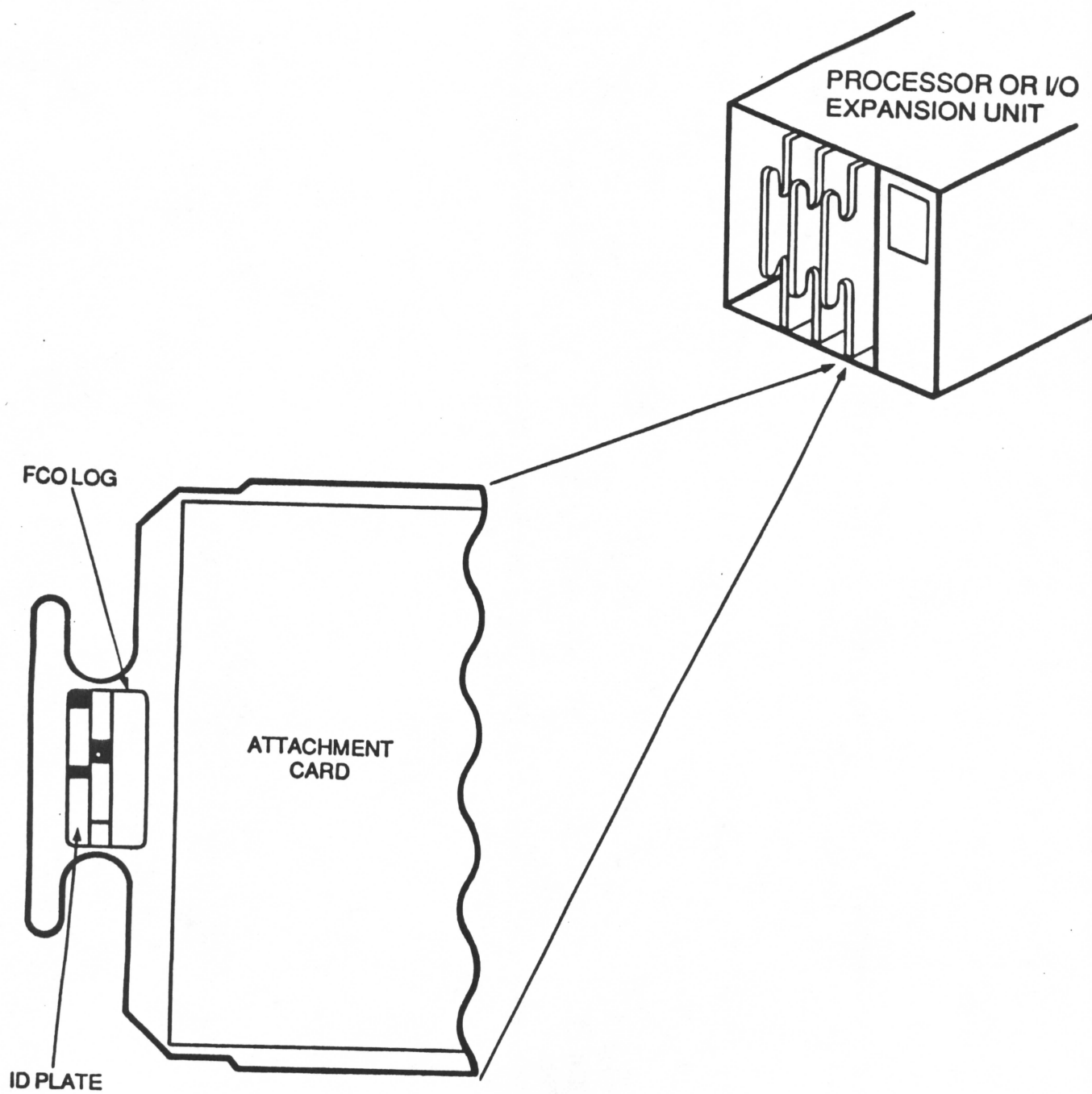


Figure 3.3.14 Attachment Card FCO Log/ID Plate

Command Name	Code (address bus bits)		Data Bus Bits 0 Through 15	Description
	0123	4567		
PREPARE	0110	0000	Bits 1-10 = zeros Bits 11-14 = interrupt level Bit 15 = enable interrupt (1) or disable interrupt (0).	Enter interrupt parameters into the prepare register. Must be received before an interrupt-causing command is executed.
DEVICE RESET	0110	1111	Data bus = zeros	Reset all pending interrupts and previously established control and status conditions. Does not reset device ID, device address, data address, and prepare registers.
READ DEVICE ID	0010	0000	Data bus = zeros	Load the device ID word onto data bus bits 0 through 15 for processor storage.
START	0111	0000	Data bus = DCB address	Initiate data transfer in cycle-steal mode to execute one or more of the I/O operations described in DCB word 0.
START CYCLE STEAL STATUS	0111	1111	Data bus = DCB address	Initiate data transfer in cycle-steal mode to execute a cycle-steal status I/O operation.
START DIAGNOSTIC 1	0111	1101	Data bus = DCB address	Initiate microprocessor self-test with results indicated in status words.
START DIAGNOSTIC 2	0111	1110	Data bus = DCB address	Initiate an internal bus test.
START DIAGNOSTIC 3	0111	1100	Data bus = DCB address	Initiate a RAM read, a RAM write and execute, a Read tape status, an ECC test, or a wrap test.

Table 2-11 Attachment Card Commands

Command Byte	Command Description
0000 0001	SELECT DRIVE 1
0000 0010	SELECT DRIVE 2
0010 0001	REWIND
0010 0010	ERASE THE ENTIRE TAPE
0010 0100	RETENSION THE TAPE
0100 0000	WRITE DATA *
0110 0000	WRITE FILE MARK (WRM)
1000 0000	READ **
1010 0000	READ FILE MARK (RFM)
1100 0000	READ STATUS
1010 0011	SEARCH FOR UNRECORDED DATA
1100 1111	READ FORMATTER ID

* Writes the number of bytes specified in DCB word 6.

** Reads the number of bytes specified in DCB word 6.

Table 2.21 Drive Formatter Commands